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COMPUTERWORLD

PC software takes next step

Downside to suites refuels interest in best-of-breed applications

By William Brandel and Ed Scannell

After paying a single-product price for application suites and reaping the rewards of one-stop shopping, information systems managers are deciding they want the option once again of buying best-of-breed applications.

In short, users want to have their cake — cheap but leading-edge software — and eat it, too. And margin-pressured PC software vendors are scrambling to serve it up with new packaging and licensing deals.

Sour on suites

Out of 400 IS managers surveyed, 55% did not think highly of suites, for the following reasons:

If we do not use an application, it is a waste	26%
We do not like being locked into one vendor	19%
There is always an undesirable product in the suite	10%

Source: International Data Corp., Framingham, Mass.

Since their advent more than two years ago, application suites — discounted bundles of applications — have sold quite well. In fact, sales have more than doubled over the past year, according to International Data Corp., a market research firm in Framingham, Mass. Some industry research figures cite more than $1 billion in suite sales during 1993.

As the market matures, however, the IS community is beginning to see a downside to suite offerings from vendors such as Microsoft

. Suites, *page 15*

Industry turning to components

Cross-vendor-supplied components are expected to spur development of a new genre of networked software licensing products.

By Ed Scannell and William Brandel

Bulging PC applications and shrinking profit margins are forcing major software developers to hasten delivery of componentized applications, which promise to cut development costs and speed delivery of cheaper, more innovative products.

As emerging object technology crosses paths with corporate users' impatience over methods for upgrading applications (see story at left), this new building-block approach will empower information systems shops to create their own applications with vendor-supplied components. "Our primary goal is to move out appli-

Industry, *page 14*

Proven hand to guide Novell

By Elisabeth Horwitt

Novell, Inc. last week confirmed it is handing over its reins to Hewlett-Packard Co. executive Robert J. Frankenberg, who is said to be an experienced fighter, innovator and strategist.

Robert J. Frankenberg *quickly turned HP into a PC player*

Industry observers agreed those are precisely the qualities needed to successfully meld Novell's highly diversified and fragmented product lines into a winning strategy to battle what one information systems executive called "the operating system wars of 1995."

Frankenberg will take over immediately from 70-year-old President and Chief Executive Officer Ray Noorda, who said he will lend a hand "only when asked."

At the same time, Noorda announced that the Office of the President, which directed Novell's day-to-day operations during the past few

Novell, *page 10*

Open systems

Oil pilot strikes savings

By Jean S. Bozman

The oil industry took a giant step last week toward leveraging open systems to cut information technology costs.

Now at the end of its three-month-long, $500,000 industry pilot project, the Petrotechnical Open Software Corp. will ask 150 software vendors to port their applications to a common data model and set of open systems standards. At the same time, a second POSC test will start in Europe.

Seven of the world's largest oil firms — such as BP Exploration, Arco Oil & Gas Co., Mobil Oil Corp. and Shell Oil Co. U.S. — backed the pilot. Based in Houston, the pilot was intended to test the theory that the industry could create a single model for a data repository that any firm could use to share exploration and drilling data on joint projects.

Glenn Breed, a POSC co-founder and former BP Exploration executive, said the industry could cut information technology costs related to exploration by 30% to 50% in three years by using open systems and standards.

Oil, *page 16*

Making the strategic choice

Overblown promises, slow delivery, codless repositioning. These are facts of life in the operating systems market. Our Guide to Unix vs. NT vs. OS/2 cuts through the hype with an analysis backed by a 400-user Buyers' Satisfaction Scorecard survey and a Firing Line review of Solaris 2.3.

SCALABILITY	6.3
INTEROPERABILITY	6.3

(Based on interviews with 50 users. Scale is 1-to-10 where 10 is best.)

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Tax Systems Modernization project

IRS turns to imaging to improve performance

By Gary H. Anthes
WASHINGTON

Bob Brandon

Taxing times *for Treasury IS*

The Internal Revenue Service in mid-April is a bit like a snake swallowing a pig. Five thousand tons of paper will flow into IRS processing centers this week, and all of it must be hand-sorted, batched, numbered and keyed before any computer processing can begin.

However, the IRS is counting on recent advances in technology to eliminate the paper chase — and with it, the bottleneck that slows the receipt of your tax refund. By whittling away at the labor-intensive, error-prone paper-handling and data-entry activities, the agency says it can deliver the performance improvements the public demands.

During the next several years, the agency will roll out imaging and automated character recognition on a grand scale. Fundamentally, it hopes to substitute electrons for 2.5 billion pieces of paper annually while knocking at least a week off the time taxpayers have to wait for their checks.

IRS, *page 26*

Newspaper

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- One of the technical massively parallel processor pioneers, **Thinking Machines**, is trying to evolve its CM-5 systems into large-scale commercial database servers. *Page 65*

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- Unix has the lead in scalability and interoperability when matched against other **32-bit operating systems**, but don't count NT or OS/2 out yet. Cairo, Taligent and the continued disunity of Unix could work in Microsoft's or IBM's favor. **Firing Line:** A look at Solaris 2.3. *Page 91*

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Executive Briefing

Cost-cutting meets a heritage of autonomy, and the result could be an era of tense times at NASA. In the coming year, the space agency will consolidate work done on a dozen mainframes and two supercomputers at six sites to just three computers in Huntsville, Ala. Managers say the move will save $40 million to $90 million over five years but that NASA's culture of autonomy will make consolidation a bitter pill to swallow. *Page 6*

The oil industry took a big step toward open systems for common oil exploration and drilling activities with the completion of a three-month pilot project by the Petrotechnical Open Software Corp. (POSC). Now the task will be getting software vendors to port applications to POSC's data model. *Page 1*

Industry observers say new Novell CEO Robert J. Frankenberg has the qualities to meld Novell's highly diversified and fragmented product lines into a winning strategy to battle what one IS executive called "the operating system wars of 1995." *Page 1*

CIVIC virtues: In many factories, sparks fly when IS and manufacturing staff work together on projects. But a Honda engine factory in Anna, Ohio, has found a way to help the two groups work harmoniously. Anna's CIVIC committee brings IS together with other factory staff once a week to prioritize projects according to a point system. The Anna plant's approach is being duplicated in other Honda factories. *Page 81*

Paper, paper, everywhere. The IRS hopes to automate data entry, forms handling and storage with new imaging and character-recognition technology. The IRS is also implementing an executive information system that will enable hundreds of IRS executives to electronically access a slew of nationwide tax data for the first time. *Pages 1, 26*

Chase Manhattan Bank formally announces an outsourcing deal, but executives acknowledge that savings from having AT&T manage its telecomm network will be less than expected. *Page 4*

A licensing battle between Computer Associates and outsourcer EDS has caught the UK's major tax agency in the middle. Inland Revenue has delayed its outsourcing deal with EDS and is re-examining its software strategy because CA didn't approve the transfer of Inland Revenue's license for the CA-IDMS database management system to EDS. *Page 14*

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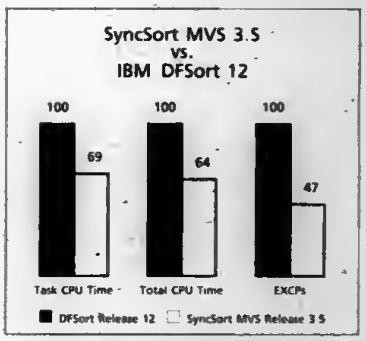

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Chase farms telecom to AT&T

Savings scaled back to realistic $10 million

By Thomas Hoffman

After formally announcing that it has outsourced the bulk of its global and domestic telecommunications operations to AT&T, executives at The Chase Manhattan Bank NA said last week that cost savings from the pact will be considerably smaller than expected.

Chase's Douglas T. Williams: *'We met our financial objectives with this contract'*

The bank's original goal of saving $20 million to $25 million per year has been scaled back to $10 million in projected annual cost savings from the AT&T outsourcing pact, Chase officials confirmed.

"Due to the complexity of the contract, after AT&T conducted due diligence, the reality of the contract requirements set in," said Tom DeCanio, vice president of network planning at Chase and the executive overseeing the Chase/AT&T relationship.

Although Chase executives declined to disclose the length or value of the contract, which took effect April 1, sources close to Chase pegged the deal at $80 million to $100 million annually for the next seven to 10 years [CW, Jan. 24].

Most banking outsourcing deals result in 15% to 20% in operational cost savings, according to Bill Bradway, an analyst at The Tower Group, a Wellesley, Mass., consultancy that examines technology use in the financial industry.

Under terms of the agreement, AT&T's Accumaster Management services group will manage the bank's global communications backbone and international circuits. On a domestic level, AT&T will oversee Chase's data network engineering, network implementation — including hubs and routers — and voice implementation.

Although AT&T will manage the bank's LAN infrastructure, Chase will continue to handle its own LAN services, including its client/server environments and network operating systems, according to Douglas T. Williams, senior vice president of technology services at Chase. "We met our financial objectives with this [outsourcing] contract," Williams said.

Still, sources said the outsourcing deal has created some turmoil within Chase. Last year, after employees were informed of plans to outsource telecommunications, dozens of corporate telecommunications staffers reportedly left the bank, fearful that the one-year employment commitment from Chase was unstable.

DeCanio refuted those claims. "There was not a mass exodus following this," said DeCanio, who insisted that Chase worked hard to ensure the well-being of the affected staffers. "The employees are the ones who will make this [outsourcing deal] fly or not fly."

Sources said 150 of Chase's telecommunications staffers have been transferred to AT&T. Williams confirmed that the number was in excess of 100.

Another sticky wicket involves carrier redundancy. In the past, Chase maintained redundant telecommunications feeds from AT&T, MCI Communications Corp. and others. Under the outsourcing deal, AT&T will likely be the sole carrier.

Having multiple carriers does not necessarily mean redundancy will be ensured, as evidenced by the February 1993 bombing of the World Trade Center, in which a slew of carriers was knocked out of service.

"With the advances in technology, it's quite reasonable to expect someone like AT&T to provide all the necessary redundancy and contingency services by themselves," Bradway said.

Outsourcing trends

Over the past few years, some of the big players in the banking industry have been outsourcing utility-type pieces of their operations to third-party vendors. For example, Republic N.Y. Corp. handed over its network services to Electronic Data Systems Corp. and NationsBank farmed out its data center activities to Perot Systems Corp., according to Bill Bradway, an analyst at The Tower Group, a banking and technology consultancy.

Sybase misses database deadline

By Kim S. Nash

■ Sybase, Inc.'s parallel processing database product will ship six months late because of performance shortfalls at the single test site using the technology, Stewart Schuster, executive vice president of marketing, acknowledged last week.

Navigation Server, which runs on NCR 3600 massively parallel processors, is aimed at users seeking to perform decision-support or transaction processing from very large databases on the order of a terabyte or hundreds of gigabytes of data. Although the market for such systems is relatively small, the niche is growing, analysts said.

Long-term repercussions

A shipping delay "loses the company business [and] also costs them mindshare," said Rob Tholemeier, an analyst at Meta Group, Inc. in Burlingame, Calif. "Informix and Oracle will win the most decision-support business over the next year or so because of this," he said.

Tests at Kwasha Lipton, an insurance-related firm in New York that is trying out Navigation Server, have turned up processing bottlenecks and areas where additional product tuning is necessary, according to Schuster. He declined to specify what performance targets must be reached before Sybase and development partner AT&T Global Information Solutions, formerly NCR Corp., ship Navigation Server.

However, based on the most recent test results — the details of which Sybase declined to give — the company is "now committed to general availability of Navigation Server by [the fourth quarter]," said Jim Pickrel, a Sybase senior manager. Two more test sites are expected to be added later this month, Pickrel said.

Officials at Kwasha Lipton could not be reached for comment. AT&T Global Information Solutions also acknowledged the delay, but officials declined to be interviewed.

Sybase introduced Navigation Server more than a year ago, as part of a dozen products in its System 10 line. In November 1993, a Sybase executive said the product would go into beta testing in December, with general availability slated for mid-1994.

Historically, systems from Tandem Computer, Inc. and AT&T's Teradata unit have captained the narrow group of users who perform complex decision support with parallel database technology. However, mainstream Unix database makers, such as Oracle Corp., Informix Software, Inc. and Sybase, have announced plans in the past year to elbow in.

In fact, a rival offering from Informix, dubbed OnLine 7.0, arrived last month. Also, Oracle has promised to ship some parallel query features in Release 7.1 of its database in mid- to late 1994. While Informix and Oracle have built, or promised to build, parallel query processing and other features into their core database, Sybase's idea is to offer similar functionality via the Navigation Server, which is an add-on module.

Three on the way

Sybase plans to announce three new ports for Navigation Server late this month: IBM, Hewlett-Packard and Sun. Still undecided is which models from the Unix hardware makers will support the database product. In any case, AT&T's NCR 3600 line will have Navigation Server for six months before rivals, as part of a codevelopment pact between Sybase and AT&T.

Software firms add data access tools

By Rosemary Cafasso

Enterprise software companies are gearing up to provide more tools and mechanisms to open the massive troves of data in corporate systems.

Software AG of North America, Inc. and SAS Institute, Inc. are scheduled this week to announce products that provide easier access to their own data environments as well as other vendors' databases, according to sources briefed by the companies.

Software AG is planning today to roll out Esperant, a desktop query tool that uses an expert system designed to prevent users from making mistakes by guiding them through a SQL query.

Meanwhile, SAS is scheduled to kick off its annual user conference this week by outlining plans to open up the SAS environment. The company is expected to announce plans to support Microsoft Corp.'s Open Database Connectivity specification, which would give third-party tools that support this specification access to SAS data.

In addition, IBM is now readying a desktop query tool launch for next month, according to sources. The tool, designed for Windows desktops, will access IBM and non-IBM SQL data.

Esperant is shipping now to beta customers and will be generally available May 31. Prices start at $595 per copy and drop to $355 per copy for volume purchases. The tool, according to analysts who have been briefed, could appeal to information systems and end users because it enables the latter to write their own SQL queries if they have programming experience or assemble a query solely from menu selections.

"A whole slew of tools use graphics that make it easier to construct SQL commands," said John Rymer, a vice president at Patricia Seybold Group in Boston. "Software AG put an expert system between the user and the database, and they've added a lot of value. Right now it's just too bloody hard to work with databases."

Analysts said Esperant's menu-driven option comes close to bulletproofing the process because it will not let users make an illogical selection when building the query.

Typically, a user sets up a SQL query that requires temporary or intermediate joins that essentially link searches to different areas in a database. Without solid SQL understanding, a user could set up a query that incorrectly joins data and delivers the wrong result.

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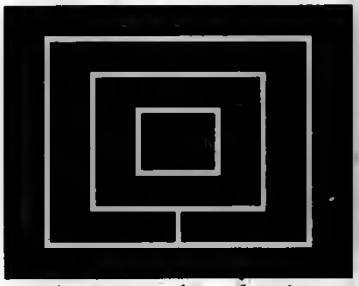

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Downsizing NASA plans data megacenter

By Gary H. Anthes
WASHINGTON

■ Faced with mounting pressure to cut costs, NASA is breaking a tradition of decentralized computing by consolidating a number of its major data processing centers.

By mid-1995, work now done by a dozen mainframes and two supercomputers at five sites will be handed off to three computers at Marshall Space Flight Center in Huntsville, Ala. Managers of the effort said it will save $40 million to $90 million over five years, but they acknowledged last week that the National Aeronautics and Space Administration's culture of autonomy may make the consolidations a bitter pill for some users to swallow.

John R. Garman, deputy director for information systems at the Lyndon B. Johnson Space Center in Houston, offered this blunt rationale for the consolidation effort: "If the agency is to continue a civilian space program, we have got to get faster, better and cheaper."

The data centers to be consolidated are in NASA's Office of Space Flight, which spends about half the agency's $1.5 billion IS budget. Top NASA management views the project as a prototype for a possible agencywide data center consolidation, said Richard G. Turner, the office's director of information resources.

Facilities slated to go dark include those at the John F. Kennedy Space Center in Florida, the John C. Stennis Space Center in Mississippi and the Johnson Space Center. Specialized computers dedicated to space missions will not be affected, however.

Good news, bad news

Officials at NASA, which has traditionally contracted out most data center operations, said few employees will lose their jobs, but contractors will be hard hit.

One contractor, who asked not to be named, said he believes the projected savings are exaggerated and that politics dictated the choice of Marshall — rather than the larger Johnson facility — for the new megacenter. "This is an incredible waste of taxpayer money," he said.

For its part, NASA said Marshall was chosen largely because it is the hub of the agencywide telecommunications network, an infrastructure that will be vital to the success of a system with centralized hosts and distributed users.

Turner acknowledged that the consolidation effort clashes with NASA's tradition of autonomy for its space programs.

"The notion is, if you take my mainframe and put it somewhere else, how can you hold me responsible for the end product — the space shuttle or whatever?" he said.

"We are fighting a culture, a history," Garman agreed. "But some of us feel we have to make it work. We are in this for a lot more than the savings on the" mainframe consolidations.

One way NASA has convinced senior program managers has been to promise that savings from the effort will not simply be subtracted from their subsequent annual budgets, a common practice in government. Instead, the centers will be allowed to use those savings to enhance their individual space programs.

The space shuttle Endeavor *lifts off from Kennedy Space Center where specialized mission computers will remain*

Virtual divisions

The Marshall data center is likely to tip the scales at more than 1,000 MIPS, possibly from a pair of IBM ES/9000 mainframes, Turner said. In addition, a Cray Research, Inc. supercomputer at Marshall will be beefed up to handle the load now on a supercomputer at Johnson.

Turner said applications will initially be ported "as is" to Marshall to make the transition as transparent to users as possible. "We'll put existing applications in a larger box," he said. "There will be a virtual Kennedy in one logical partition, a virtual Johnson in another partition and so on."

No stopping

Turner said nothing in the mainframe consolidation project stands in the way of NASA's inevitable move to client/server computing.

"We will see diminished use of mainframes, but mainframes will still be part of the client/server strategy" for use as data repositories, he explained. "But even if the elephants are going to the elephants' graveyard, it's smarter to have one elephant graveyard than four."

Common DB2 technology to be added to AS/400 database

By Craig Stedman

IBM, as part of its makeover of the AS/400 for distributed client/server computing, plans next month to recast the system's integrated relational database as a DB2 product built on the same SQL technology as the DB2 packages for its other computer lines.

IBM confirmed last week that an AS/400 introduction scheduled for May 3 will include a new release of the database, renamed DB2/400. The database is being altered to improve SQL querying performance and make it more compatible with the mainframe, RS/6000 and OS/2 versions of DB2, IBM said.

Changes to the database include the addition of two-phase commit, referential integrity and other features found on the other DB2s (see chart). The AS/400 will also get support for IBM's Data Propagator software, a replication product that allows data to move among different DB2 databases.

In addition, IBM will announce an initial implementation of the Open Software Foundation's Distributed Computing Environment (DCE) for the AS/400, according to industry sources familiar with its plans. The first release will enable the machine to participate as a node on a DCE-based network, the sources said.

John Fulton, technical manager for the AS/400 database, said the coming changes should improve the AS/400's ability to interoperate and share data with IBM's other systems. "There have been some areas where commonality was lacking, but it will become a lot harder to find those differences," he said.

High hopes

Customers with multiple IBM hardware platforms applauded the DB2/400 and Data Propagator plans.

"This is certainly a step in the right direction, toward the whole client/server thing that all of us are trying to get our arms around," said Dudley Hawley, corporate manager of information systems at Toyota Motor Sales, U.S.A., Inc in Torrance, Calif. Toyota uses AS/400s, mainframes and OS/2-based systems.

Toyota hopes the common database footing will let it divide development and processing chores more effectively between the different platforms, with data stored "where that's most economically and efficiently done," Hawley added. Toyota already has links between its corporate mainframes and AS/400s in branch offices and dealerships, "but we don't do as much now as we hope to do" after DB2/400 becomes available, he said.

James Bailey, senior vice president of data processing at Massachusetts Financial Services in Boston, agreed that IBM's plans sound "great for somebody like us." The mutual funds company uses the RS/6000 and OS/2-based LAN servers in addition to the AS/400.

"For them to come along and add that commonality gives us much more flexibility to move data from platform to platform," Bailey said. He noted that the AS/400's existing SQL/400 implementation is "very unforgiving," forcing Massachusetts Financial to sometimes do database programming via Cobol hard-coding.

No longer an island

Shaku Atre, president of Atre and Associates, Inc., a database consultancy in Port Chester, N.Y., said the changes should make the AS/400 less of a stand-alone system. "The perception is that the AS/400 is in a class by itself," she said. "That has its pluses and minuses. When we're going into client/server, we're really talking about networks."

Most AS/400 customers use the system's native DDS database language rather than SQL/400, which is much slower than DDS, Fulton acknowledged. He added, however, that the SQL implementation in DB2/400 generally should match DDS and should become more popular than the native mode over time. "In client/server networks, SQL is how it's done," he said.

Four of a kind

IBM is adding the following features to the AS/400 database to bring it in line with DB2, DB2/6000 and DB2/2:

- **Two-phase commit and referential integrity:** Transactions with other machines will now be synchronized and recorded in their databases simultaneously.
- **Common filename length:** The AS/400's limit will increase from 10 characters to 18.
- **Database catalogs:** Systemwide lists of tables and columns will now be possible.
- **Triggers and stored procedures:** DB2/400 will be the first in the DB2 family to support these.

Wait. There's more.

Another item in the May 3 announcement aimed at improving the AS/400's interoperability will be the introduction of TCP/IP software rated to perform up to eight times faster than the current version. As expected, the introduction will center around new AS/400 systems code-named Century. The machines are being put in new downsized cabinets that will support processor-board upgrades to PowerPC-based models due in 1995, according to IBM.

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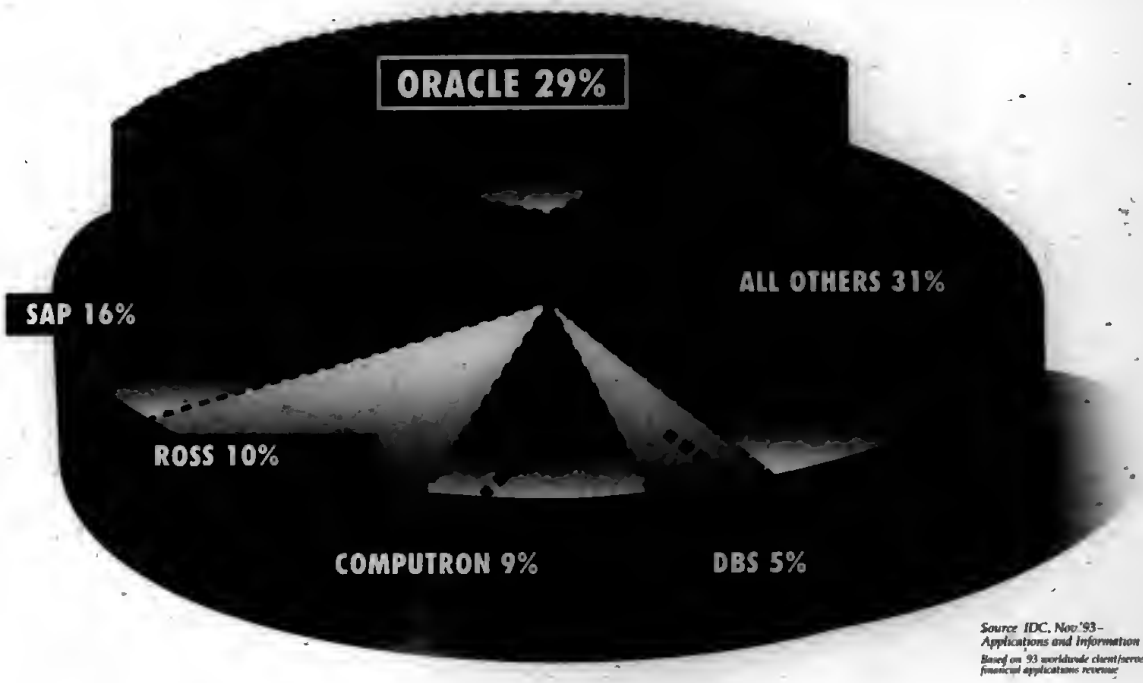

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News Shorts

American Express names new CIO

American Express Travel Related Services Co. in New York last week tapped Allan Z. Loren, a longtime chief information officer and former executive at Apple Computer, Inc., to be CIO and executive vice president starting in May. He replaces Garland Cupp, who is retiring. Loren is president of Galileo International, a global reservation system owned by 11 airlines.

Unix trademark — going, almost gone

Novell, Inc. hopes to completely sign over AT&T Unix System V Release 4.0 trademark rights to **X/Open Co.** within a month, according to Michael DeFazio, executive vice president of Novell's Unix Systems Group. The negotiations have taken a bit longer than originally hoped, primarily because X/Open had to thoroughly go over the rights and obligations to various vendors and OEMs. Novell in essence signed all these deals when it acquired Unix System Laboratories, Inc. from AT&T.

Alleged software pirate indicted

A student at MIT was indicted last week for allegedly having provided more than $1 million in copyrighted software, via a bulletin board, to Internet users worldwide. According to the indictment of David LaMacchaia, 180 computers on the Internet allegedly downloaded hundreds of files of commercial software over a recent 16-hour period. An attorney in the U.S. Attorney's Office in Boston said a request was posted to the bulletin board asking for copies of "SIM City 2000, Excel 5.0 Windows and WordPerfect 6.0 Windows."

Microsoft will support Notes FX

Microsoft Corp. will ship in June a maintenance release of software for Word, Excel and PowerPoint that gives those applications support for **Lotus Development Corp.**'s Notes FX technology. Users will be able to have specified ranges in an Excel spreadsheet that match ranges in a Notes database, according to a Microsoft group product manager. Also planned is a file filter that enables users to save an Excel spreadsheet to a Notes database and later search it as a rich text file, he added.

Document management for Windows

Xerox Corp.'s XSoft division will announce today an icon-driven document management platform for Windows-based PCs attached to Novell, Inc. NetWare servers. The system, called Visual Recall, uses an indexing and searching system for text and image files. It also has a visualization tool for applying models and graphics to the results of document searches.

Dialog helps honest folks pay royalties

Users distributing electronic copies of copyrighted articles are supposed to pay royalties, but tracking down the publisher can be a hassle. So **Dialog Information Services, Inc.** in Palo Alto, Calif., last week established a compliance service. This allows Dialog's on-line users to pay royalties based on the number of copies they make, and it remits the fees to the copyright holders.

SHORT TAKES **Computer Associates International, Inc.** and **National Car Rental System, Inc.** reached an out-of-court settlement over National Car Rental's use of CA software. Under the agreement, National has agreed to pay CA an undisclosed sum of money and will continue to use CA software. . . . **SHL Systemhouse, Inc.** won two five-year outsourcing pacts: one with securities firm **CIBC/Wood Gundy** and another to run information technology for **Tupperware** and migrate the company to client/server systems.

IBM price breaks won't set new trend

By Craig Stedman and Thomas Hoffman

While mainframe shops should see lower software prices from IBM as it implements usage-based licensing and a new capacity pricing model for parallel System/390 machines, other mainframe software vendors said they see no need to match the price breaks.

Third-party vendors reacted cautiously to IBM's pricing moves, which were announced last week along with the first parallel mainframes and a 10-way traditional ES/9000. Software houses said they may provide pricing mechanisms similar to IBM's, but that will not necessarily translate into lower costs.

"I don't know whether all of this means lowering prices," said Charles Small, marketing director at Information Builders, Inc.'s EDA Division in New York. He said Information Builders will likely put off any price changes until June, when IBM's measured usage pricing is scheduled to become available.

"There's no impact on [independent software vendors] that we can see right now," added Mark Wasilko, vice president of corporate marketing at Legent Corp. in Herndon, Va. "In a lot of ways, this is IBM playing catch-up."

Room to breathe?

IBM is seen as more expensive than most other mainframe software vendors, but not by much

On a scale of 1-to-5, where 1 is very inexpensive and 5 is very expensive, users rated the relative costs of dealing with various software mainframe vendors

	Average Rating
Legent	3.2
SAS Institute, Inc.	3.2
Sterling Software, Inc.	3.2
Boole & Babbage	3.4
BMC Software	3.5
Candle	3.6
IBM	3.7
Computer Associates	3.9
Duo & Brandywine Software, Inc.	3.9

BASE: 106 RESPONDENTS

Source: *Computerworld* Database Division, Framingham, Mass.

The competition

Andrew Filipowski, chief executive officer of Platinum Technology, Inc. in Oak Brook Terrace, Ill., noted that most independent software vendors compete with one another more than with IBM. That puts Platinum and other vendors "in a biosphere," where they are somewhat insulated from IBM's actions, Filipowski said.

Executives from Computer Associates International, Inc., Candle Corp., BMC Software, Inc. and Boole & Babbage, Inc. said they also do not expect to lower their prices as a result of IBM's moves. "We don't see this affecting our business at all," said Kurt Seibert, CA senior vice president.

However, holding the line on price may be difficult. Several customers said they are looking for reductions in the overall cost of mainframe computing, including the software they get from independent software vendors.

"The software clearly has to get cheaper" or companies will continue moving applications off of mainframes, said John Chapman, a senior technology consultant at Amoco Corp. and president of the Share, Inc. user group. "Clearly, IBM is starting to move the bar, and my expectation is that the rest of the industry will face the same pressure to do that."

"Once IBM starts it, I don't think [other vendors] are going to have a lot of choice," agreed Tod Dixon, vice president of information resources at Northeast Utilities in Hartford, Conn. Dixon added that much of the mainframe software he uses is "somewhat overpriced" compared with other platforms.

Nothing to fall back on

Charlie Burns, an analyst at Gartner Group, Inc. in Stamford, Conn., said software vendors are in a tougher position than IBM, which hopes to offset declines in software revenue with increased hardware sales.

Independent software vendors "don't have hardware to fall back on and are reluctant to take the gamble" of lowering prices in the hope of spurring demand, Burns said. He added, however, that customers "are kind of running out of patience."

As expected [CW, April 4], IBM will begin offering measured usage pricing in June on the CICS and IMS transaction managers and its TSO/E software. The DB2 and IMS databases will be supported later, after overhead problems created by the measurement tools are solved, IBM executives said.

Capacity-based prices on parallel systems tied together by IBM's Sysplex technology will generally be lower than the existing pricing for traditional ES/9000s, IBM said. Analysts estimated that customers could see reductions of 10% to 30% from both the measured usage pricing and the new parallel capacity structure, but it will vary from site to site.

Query server will stand alone

IBM last week said it plans during 1995 to uncouple its System/390 Parallel Query Server (PQS) from the ES/9000 mainframe line and enable it to attach directly to both SNA and TCP/IP networks as a stand-alone database server.

The initial 48-processor PQS, which started limited shipments last week, is a read-only DB2 query engine that requires an Escon-capable ES/9000 to do database updates. Querying must stop while the database is reloaded, and the mainframe tie keeps the PQS from being used in departments, analysts said.

Gary Ferdinand, director of System/390 coupled systems for IBM, said the network-attachable PQS should be ready "sometime next year." IBM's plan to turn it into a general-purpose machine is similar to a database server strategy outlined by Amdahl Corp. recently [CW, April 4].

Charlie Burns, an analyst at Gartner Group, Inc. in Stamford, Conn., said that making the PQS a stand-alone system with its own database updating capabilities would leave little difference between it and IBM's System/390 Parallel Transaction Server.

IBM will likely have to change the way it prices the PQS because the query machine has bundled hardware and software pricing and the transaction system does not, Burns added. "They literally don't have this all figured out yet, but they know that they have to do it," he said.

PQS is aimed at stemming the flow of DB2 users to Unix-based decision-support systems, particularly AT&T Global Information Solutions' Teradata DBC/1012 database engines. Typical PQS pricing will be about $1.5 million, IBM said.

— Thomas Hoffman and Craig Stedman

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Novell guide

CONTINUED FROM PAGE 1

months, will be dissolved.

That office's members, including Mary Burnside, chief operating officer; James Tolonen, chief technology officer; and Ad Rietveld, head of Novell's applications software group, will report directly to Frankenberg.

Frankenberg's "first major priority [will be] pulling all the pieces together and making them fit," said Stash Jarocki, vice president at Citibank NA. Specifically, Frankenberg must finish the job Noorda started: metamorphosing Novell from a network operating system vendor to a "total package" supplier that integrates NetWare services, third-party applications and the AppWare development environment, Jarocki said.

Another early priority should be convincing third-party developers that Novell can maintain its avowed spirit of "coopetition" while competing directly against other desktop vendors through the WordPerfect product suite, said Mary McCaffrey, a principal at investment firm Alex. Brown and Sons, Inc.

Asked by analysts last week how he plans to steer Novell clear of the anticompetition charges currently leveled at Microsoft Corp., Frankenberg echoed what Novell executives have said in the past. He said Novell will continue to work with competitors and make interfaces to its products "publicly available."

In fact, Frankenberg expressed optimism about the decision to acquire WordPerfect Corp. He also endorsed nearly all of Novell's current strategies. The sole exception was Novell DOS, which he referred to as an "interesting technology." However, Frankenberg hinted that Novell would soon announce products that would explain why it has held on to that operating system.

Novell's new CEO will spend the next 90 days in "immersion therapy," meeting customers, partners and Novell employees to get up to speed, Frankenberg said at a press briefing last week.

Former Novell CEO *Ray Noorda said he will lend a hand 'only when asked'*

Once that period is over, however, his work history indicates he is likely to start making some strong moves.

He has an impressive record of identifying and implementing a vision and turning around weak product strategies, observers said. His most notable achievement, all agreed, was putting Hewlett-Packard Co.'s PC business in the black over the past three years.

Taking chances

Taking on his PC assignment in 1991, Frankenberg began implementing changes the following year that included expanding sales into reseller channels, cutting prices and overhead and delineating products along server, desktop, network and mobile lines.

"You have to give Frankenberg his due for an ability to seize the moment," said Richard Zwetchkenbaum, a research manager at International Data Corp. in Framingham, Mass.

"He took advantage in the 1992-1993 time frame of a shortage of systems from major vendors like IBM and Compaq by bringing to market, in a very timely fashion, high-quality, competitively priced desktop PCs and servers," as well as the OmniBook notebook and a handheld PC, Zwetchkenbaum said. Today, HP's PC business is "one of the leaders."

HP's rank jumped from 20th to 11th or 12th since Frankenberg took over, said Randy Giusto, an analyst at BIS Strategic Decisions in Norwell, Mass.

Frankenberg also gained extensive experience "going head-to-head with Microsoft" during the time he championed the development of NewWave, HP's less-than-successful front end for Windows, said Phil Sakakihara, a manager at HP who was involved in the project.

An HP spokesman said the firm will name a replacement within two weeks.

West Coast senior correspondent Mark Halper contributed to this report.

What happens when PC vendors merge? See pages 34,35.

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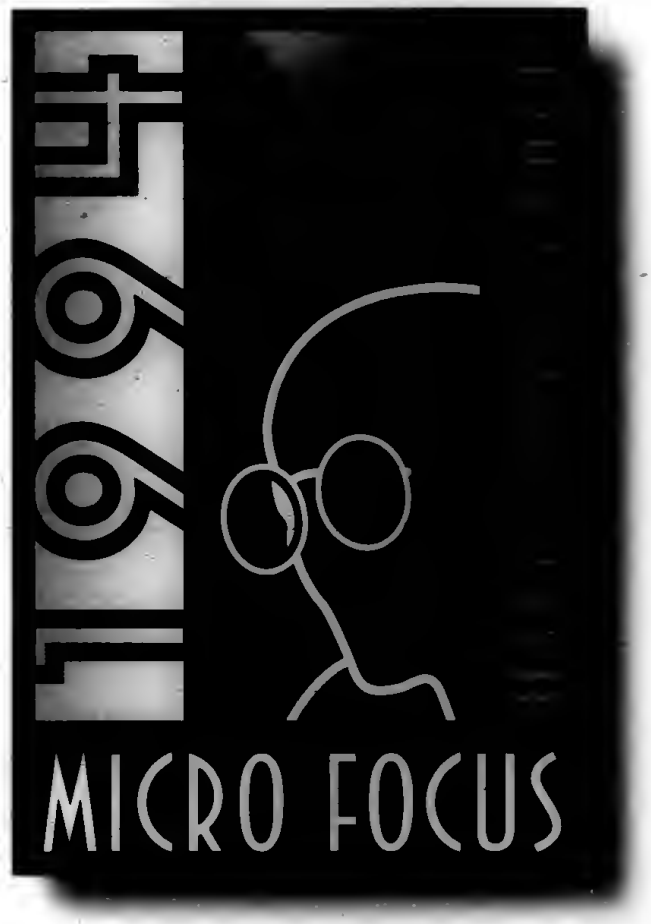

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Remote router IQ rises

By Stephen P. Klett Jr.

Early remote-access routers sacrificed management capabilities and intelligence to deliver the lowest cost per box. But recent offerings have begun to focus on a more pressing concern for users: reducing the yearly cost of ownership.

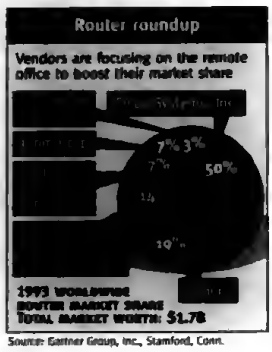
For example, Wellfleet Communications, Inc. in Billerica, Mass., and CrossComm Corp. in Marlboro, Mass., are expected today to unveil low-end router lines that feature more robust remote-management capabilities, automatic installation and configuration software and data compression.

These capabilities are aimed at either eliminating the need to have trained personnel on-site to manage the devices — which can cost more than $40,000 each year in salary per site — or at least reducing the number of information systems staff visits to branch offices.

Routers with feature sets similar to Wellfleet's and CrossComm's have also been announced recently by Cisco Systems, Inc. in Menlo Park, Calif., Retix in Santa Monica, Calif., and Develcon Electronics Ltd. in Saskatoon, Saskatchewan.

"Routers are famous for being administrative headaches," said Michael Howard, president of Infonetics Research, Inc. in San Jose, Calif. "When you multiply the number of routers by the number of branch offices, you increase this headache by a factor of 10 — users must decide if they can really afford the added complexity."

This headache is prompting some users to investigate alternatives to routers such as intelligent bridges, remote-access servers and multiplexers from companies such as Hypercom, Inc., Sync Research, Inc. and Telebit Corp. for branch office connections [CW, March 21].



Source: Gartner Group, Inc., Stamford, Conn.

Users faced with shrinking IS budgets welcome this increased focus among router vendors on ease of use and cost reduction.

For example, Home Savings of America spends roughly $200,000 a year for management coverage of 122 Cisco routers that are installed at its headquarters in Irwindale, Calif. The bank would like to roll out routers to its more than 350 branch offices nationwide, but it would cost too much to manage them — more than $1 million.

Cost too exorbitant

"It's ridiculous to pay that much just to manage routers — it's more than we pay IBM for support of all our legacy equipment," said Sam Picture, manager of telecommunications at Home Savings.

"We're spending far too much money to manage our routers and having to send people to remote locations far too often," said a network administrator at a large bank who requested anonymity. He did not give figures but said his bank's costs were in line with those reported by Home Savings. However, he said the remote monitoring, auto configuration and data compression abilities could "theoretically" cut his yearly installation, configuration and service costs by 40% to 50%.

Beta users said Wellfleet appears to be on track with its $2,295-and-up Access Node line.

"The Access Node is usable," said Rob Drye, a network administrator at a Wellfleet beta site in New Hampshire. "I don't have to make constant runs to the manual for help, and once it's set up, I can pretty much forget about it."

Tivoli offers CORBA version of systems management

By Elisabeth Horwitt

Tivoli Systems, Inc. will announce this week what it says is the industry's first truly distributed CORBA-compliant, networked systems management product.

Tivoli Management Environment (TME) Version 2.0 uses the Object Management Group's Common Object Request Broker Architecture (CORBA) to distribute management functions across multiple servers, providing the scalability to support enterprise client/server systems as well as portability across a wide range of Unix platforms, said Frank Moss, president of the Austin, Texas, firm.

IBM, Hewlett-Packard Co. and OpenVision are among those working on CORBA-compliant systems management platforms. A major differentiator for TME 2.0, however, is its transaction management technology. It provides features such as rollback to ensure management nodes and managed systems exchange alerts and commands reliably across a geographically distributed enterprise, Moss said.

GTE Data Services recently became a TME 2.0 beta site and is looking for it to "really improve scalability" over its current TME 1.6 system, said Dave Hart, an acting manager of systems management deployment at the Tampa, Fla., firm. The current system is about to hit a performance ceiling, performing software distribution and user management across 120 HP/UX nodes by HP.

With TME 2.0, Tivoli is moving more aggressively into the operations management arena, providing a central console from which users can collect alerts from popular systems, including Sybase, Inc. and Oracle Corp. databases; Microsoft Corp.'s Windows NT, Windows and DOS systems; Unix; Novell, Inc.'s NetWare systems; and Simple Network Management Protocol-based management systems.

TME 2.0 is expected to become generally available in the third quarter. Applications are priced at $125 to $9,000 per node. The enterprise console is priced at $20,000.

IBM licenses Tivoli framework technology. See story page 51.

CAMP conference

PC Co. stands by its architecture

By Jaikumar Vijayan and Michael Fitzgerald
ROSEMONT, ILL.

IBM PC Co. President Robert Corrigan last week said the company will not abandon the Micro Channel Architecture (MCA), despite user concerns, shrinking market share and press reports to the contrary.

"I am not killing the Micro Channel," Corrigan said at a meeting of the Corporate Association of Microcomputer Professionals (CAMP). MCA is a staple bus for the PS/2 line and can be found in IBM's high-end servers and RS/6000 workstations.

In a separate interview, Corrigan explained that IBM must rationalize its corporate line. But he added that "it is not a practical answer for me to kill" MCA — in no small part because of its success in Europe.

IBM PC Co.'s Robert Corrigan: *Not killing Micro Channel*

Anticipated changes

Corrigan conceded, however, that he expects the market for MCA boxes to continue shrinking. He told users that IBM will bring many other PS/2 features into the mainstream ValuePoint line. Corrigan also hinted that the company may change the names of its PCs in the future, saying, "I am not married to names."

Well-placed sources said IBM will use a PCI-to-MCA bridge chip in its next-generation MCA machines, allowing it to base the line on the Peripheral Component Interconnect (PCI) bus and support MCA adapter cards. Corrigan refused to confirm this. He did say that any such moves in the product line will probably not happen until the fourth quarter.

Users reacted to Corrigan's comments with a mixture of relief and indifference.

"It's good to hear that they're not planning to cancel [MCA]," said Jerald S. Noble, the American Cancer Society's director of telecommunications and PC support.

But many users said they were not overly concerned with MCA anyway. At one large Midwest manufacturer, MCA boxes have been relegated to the development staff, according to a PC manager who asked not to be named.

Even the PCI bridge strategy did not impress this user who said, "The Micro Channel cards we have are a throwaway investment. It seems like they never work in the next-generation machines anyway."

Analysts agreed that IBM has little choice but to continue supporting a technology that many say has already lost out on the desktop to the AT bus and PCI.

So far some 9 million MCA machines have been sold, almost all of them by IBM.

"The catch-22 with MCA is that IBM has sold too many of them to simply walk away from it now, though a lot of users don't consider it important on the desktop," said Randal Giusto, an analyst at BIS Strategic Decisions in Norwell, Mass.

Supply chases demand

PS/2 supply issues caused by component shortages and a glitch in the new BIC32 controller chip that has delayed PS/2 Models 76 and 77 drew user ire at the CAMP conference.

"We are getting estimates of August [delivery] all the way to the end of the year for PS/2," fumed David Pinkard, senior technical specialist at Mallinckrodt Medical, Inc. in St. Louis.

IBM PC Co. President Robert Corrigan pleaded for sympathy on PS/2 supply problems: "I'd be a lot better off mentally ... if we were shipping more. This is causing me a lot of pain."

Corrigan said the PS/2 situation should start to ease in the next couple of months, as IBM has begun shipping the older versions of the 76 and 77. It expects to ship the new versions in June.

But some users said they think Corrigan needs to understand their pain.

"We are going through a growth mode, and we need our machines now," said Rosalio Bueno, manager of banking systems at Household Financial Network.

—Jaikumar Vijayan and Michael Fitzgerald

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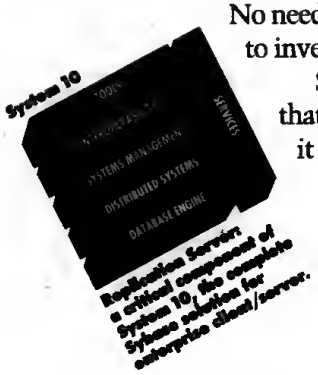

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McCaw Cellular

Court ruling could delay AT&T buy

By Ellis Booker and Michael Fitzgerald

A court spat between AT&T and BellSouth Corp. and potential pressure from the Justice Department could mean a big bump in the road for AT&T's purchase of McCaw Cellular Communications, Inc.

But analysts said the dispute should not derail the Cellular Digital Packet Data (CDPD) protocol.

Last week, U.S. District Court Judge Harold H. Greene ruled that AT&T's planned $12.6 billion buyout of McCaw runs afoul of the 1982 consent decree that broke up Ma Bell. McCaw owns some cellular properties jointly with the regional Bell operating companies (RBOC), and AT&T is not allowed to purchase assets of any RBOC under the consent decree.

A McCaw spokesman said the ruling should not impact the company's plans to finish rolling out its CDPD network by year's end.

Judge Greene left open the possibility that AT&T could seek a waiver, provided it could prove that receiving one is "in the public interest." An AT&T spokesman said the company will seek a waiver from Judge Greene "within weeks" and added that the company was confident the waiver would be granted.

The case brought consensus from other carriers and analysts that changes in technology, represented by wireless networks, outstrip current regulatory and legislative structures.

For instance, cellular networks provide long-distance carriers with a way to sidestep local phone service providers.

"The whole regulatory framework is becoming obsoleted by events," said John E. Rooney, president of Ameritech Cellular Services in Hoffman Estates, Ill.

Without AT&T's financial and strategic technical support, debt-laden McCaw will have difficulty accomplishing its overfull plate of projects, according to Ira Brodsky, president of market research firm Datacomm Research Co. in Wilmette, Ill.

Along with McCaw's behind-schedule rollout of its CDPD service, Brodsky said, the company is converting to digital cellular, setting up nationwide roaming, bidding on personal communications services licenses and backing the ambitious Teledesic global satellite system.

No loss

A McCaw spokesman in Seattle said even in the worst-case scenario, in which McCaw would divest its cellular holdings in Houston and Los Angeles, customers should still have nationwide CDPD access.

CA, EDS embroiled in outsourcing dispute

By Ron Condon
LONDON

An ongoing legal dispute between Computer Associates International, Inc. and Electronic Data Systems Corp. has forced the UK's Inland Revenue to delay a major outsourcing contract and undertake a costly software rewrite.

Inland Revenue was due, at the beginning of this month, to hand management of its entire computer operations over to EDS in a deal worth $1.5 billion over 10 years — making it the largest ever outsourcing contract in Europe.

But the project has been blocked and the contract remains unsigned because CA's UK subsidiary refuses to let EDS take over the licenses for the CA-IDMS database that Inland Revenue uses, according to the officials involved.

CA's UK managing director Abram Azagury said Inland Revenue has "mismanaged" the contract because it "made no attempt to ensure the outsourcer selected, EDS, would be acceptable to CA."

The outsourcing contract has been delayed at least until June, Inland Revenue spokeswoman Diane Gee confirmed. "We have not been given permission to transfer the software and so will either have to write new systems or find a new package," Gee said.

Replying to CA's charge, she said, "They are entitled to their opinion, but we cannot comment."

EDS refused to discuss the Inland Revenue situation. "We are still in negotiations with Inland Revenue," said EDS spokesman Ian Hogg.

Separately, CA and EDS have been locked in a legal battle in Texas for the past two years over EDS' use of CA software for its outsourcing clients. CA is seeking more than $2 billion in damages. "This [court case] has yet to be resolved," Azagury said. "We are adamant that it is not in our interest to afford EDS access to CA software in these circumstances."

Condon is London correspondent for the IDG News Service.

Industry turning to components

CONTINUED FROM PAGE 1

cations onto [the] desktop," said Lee Allen, manager of decision-support systems at Schering-Plough Corp. in Union, N.J. "It would be nice if you could break off functions between different applications and just link them together and not have to pay for all these applications."

Change in direction

Such an approach is a clear break from the existing full-featured application model. Already, pieces of the new methodology are finding their way to market.

For example, Object Linking and Embedding (OLE) 2.0, Microsoft Corp.'s next-generation object environment under Windows 4.0, is pushing vendors such as WordPerfect Corp., Lotus Development Corp., IBM and Apple Computer, Inc. to move their object-based development architectures to market more quickly.

"We have used environments like Metaphor to string components together to create applications, but the possibility of doing this under something like Windows has always been an interesting proposition to us," said Kurt Wolff, an IS professional at a large Midwestern conglomerate.

As a result, the top-tier vendors are clearly spelling out their strategies for such object-oriented frameworks:

- Ad Rietveld, WordPerfect president and newly appointed head of Novell, Inc.'s applications software group, said WordPerfect is already moving toward a component-based application-building scheme based on OpenDoc, an emerging standard for compound document architectures from Component Integration Laboratories.

Using OpenDoc, users can mix and match different objects, such as a thesaurus or a spell checker, and build them on top of a text editor engine. Users would then be charged per component, instead of paying for a full-blown WordPerfect application, Rietveld said.

- At the Chicago Area Microcomputer Professionals conference last week, Randy Spitz, Apple's vice president of desktop systems and strategies, singled out the trend toward componentized software as one of Apple's strategic goals for the 1990s.
- Taligent, Inc. has included a licensing framework in its first series of application frameworks. It automatically meters and authorizes the use of any new or existing component or application written for any environment.
- IBM will later this year release OS/2 2.2, which will include support for OpenDoc.
- Lotus is also moving toward a component-based application building architecture, said Alex Morrow, general manager of product line architecture. He said Lotus has yet to commit to basing its strategy around OpenDoc, Taligent or OLE 2.0. He added, however, that Lotus has been working on OLE 2.0 for a few years and that it has a "sound implementation strategy."

On the other hand, WordPerfect is clearly committed to OpenDoc, said Dave Moon, vice president of development at the company. Moon contended that WordPerfect has already begun building its applications on a component-based architecture and is not that far from being able to offer customers "Plug and Play" building blocks.

"We are talking about packaging it up differently so that end users can access [the components] better to build their own solutions," Moon said.

Myriad benefits

This strategy is expected to sit well with users for a number of reasons. Not only will it gain them more choice, but this new building block model will also rapidly decrease their own and independent software vendors' development time to market. Also, the Plug and Play model is expected to greatly simplify and expedite software upgrades.

Top-tier vendors such as WordPerfect and Apple are clearly spelling out their strategies for object-oriented frameworks.

Many observers say component software will revive the robust software cottage industry of the early 1980s, under which many small developers thrived. It may also create the opportunity for corporate accounts to develop and sell their brand of software to other end users.

"I think [components] are interesting, but the vendors must come up with some interesting ideas that are marketable. You can't just do things like spell checkers because everyone already has one," said Mike Drips, an IS executive at a large Florida-based telecommunications firm.

Still, some analysts say even components as mundane as spell checkers will benefit users if they can be used with any application across any platform.

"If you can walk into a retail store and buy something like a spell checker that can be reused with whatever application you have installed, then that can only be a good thing for users," said John Dunkle, vice president at WorkGroup Technologies, Inc. in Hampton, N.H.

However, while mixing and matching object-based components is expected to improve the quality of applications as well as speed their delivery to market, new licensing policies will have to be forged that take into account various vendors' components in one user-built application.

Vendors are already preparing to incorporate an industry-standard licensing application programming interface (API) that could replace or augment existing licensing systems in applications.

In the next 90 days, Microsoft will deliver the software development kit for its Licensing Services API, which allows users to monitor multivendor software components more efficiently. Lotus and WordPerfect are both considering incorporating the API into the next version of their application suites, expected out later this year.

Microsoft, however, has yet to determine when and how it would deploy the API in its applications.

Suites downside

CONTINUED FROM PAGE 1

Corp., Lotus Development Corp. and the combined team of Borland International, Inc. and WordPerfect Corp. in a recent IDC survey, more than half the corporate users who have purchased suites reported negative feelings about them (see chart).

"Sure users get a lot of applications [in suites], but they also have to contend with hidden support and maintenance costs, along with licensing policies that ultimately limit their options," said Carter Lusher, an analyst at consultancy Gartner Group, Inc. in Stamford, Conn.

These concerns may prevent Eastman Kodak Co. in Rochester, N.Y., from embracing application suites. Currently evaluating packages from all the suite vendors, the company is attracted to the low-priced software but is wary of the support issues involved, an IS official at Kodak said.

Suite moves

Vertical market application developers will be given the opportunity to embed their applications into Microsoft's Office suite, said Dwayne Walker, Microsoft's vice president of sales and marketing. The program would let developers move their applications through Microsoft's Office reseller channel, Walker said. The program will be launched before year's end, he added.

Differing upgrade policies among vendors are also rubbing users the wrong way. For example, Lotus' goal is to upgrade all five products in its SmartSuite, but the company is upgrading the applications incrementally.

Microsoft's upgrade policy calls for users to upgrade the suite each time an individual program in the suite is revamped.

"It seems like all the suite's pieces are going to get incremental upgrades, so how do we install that across our users' desks?" asked one systems manager at a major manufacturer in the Midwest. "This is a big issue for us."

Addressing complaints

Developers are now rushing to address some of those complaints by sweetening large volume deals aimed at corporate customers.

For example, WordPerfect plans to roll out two flexible software bundles during the next 60 to 90 days. The product suites will be delivered by year's end, a spokesperson said.

WordPerfect will offer users a choice of which applications in the suite to deploy, the spokesperson said. Instead of being offered an all-or-nothing suite option, users will load a CD-ROM that will allow them to deploy individual applications to users' desktops.

The new suites will offer a flexible licensing structure that will charge users only for the applications they deploy, priced on a suite basis.

Vendors are also trying to broaden the appeal of suites through volume licensing programs.

Second launch

Microsoft recently launched a second tier to its Select volume-licensing program. The new three-tiered program, called Microsoft Open License Pak, will focus on unit groupings for up to 100, 500 and 1,000 users.

These new volume channel strategies are key to keeping large corporate customers enamored with the application suites, said Dwayne Walker, director of sales and marketing at Microsoft. He noted that more than half the deals based on Select, Microsoft's original volume program launched in January 1993, have included Microsoft Office.

Lotus is expected to follow Microsoft's lead with a multitier volume licensing strategy, industry sources said. This comprehensive program will give resellers the flexibility to cut their own deals. Like Microsoft's volume programs, Lotus' program targets both large corporations and small companies, sources close to Lotus said.

Competition is forcing other changes in licensing and packaging strategies as well. WordPerfect officials noted that by offering a mix and match suite, it may appeal to users who do not want the all-or-nothing Lotus SmartSuite mix.

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SunSoft bridges gap with Solaris 2.4

By Jean S. Bozman
SAN FRANCISCO

The Solaris Unix operating system is ready to play both sides of the client/server equation, users and developers were told last week at the Solaris Developer Conference here.

SunSoft, Inc. introduced Solaris 2.4, which runs on two kinds of desktop machines: Unix workstations and Intel Corp.-based PCs. The release also bolsters Sun's role as a server company by adding software utilities to manage hundreds of PCs and workstations on enterprise networks. Solaris 2.4 will ship in the third quarter.

Solaris will soon get new modules to manage PC LANs including the SolarNet TCP/IP networking product [CW, April 4], support for Novell, Inc.'s IPX/SPX protocols and support for Novell NetWare clients and servers, SunSoft said.

At a time when many mainframe sites are migrating to Unix servers, broad PC support on Unix servers is essential for coexistence, according to users at Sun's Enterprise Summit, also held last week.

"We're going to want a common look and feel for all our users," said a Solaris developer at a Midwest financial firm who declined to be named. "The challenge for us is migrating from mainframes in a piecemeal fashion, running PCs and Unix side by side."

Some of Sun's largest customers have hundreds or even thousands of PCs surrounding their Unix servers. "I don't think they expect all the PCs to disappear and be replaced by SPARCclassics," said Kingsley W. Hill, chief information officer at Rochester Telephone Corp. in Rochester, N.Y., which is installing a billing system based on Sun's SPARCcenter 2000 servers.

Big profits needed

Under pressure to boost its profits, which flattened last year, Sun is seeing its desktop plans overshadowed by its need to sell high-profit servers and information technology services.

"One day Sun realized their dream of owning the desktop with Unix wasn't really going to happen," said David Smith, director of advanced operating environments at International Data Corp. in Framingham, Mass.

The reality of that PC presence is one reason Sun's corporate emphasis is shifting away from its desktop war with Microsoft Corp., industry analysts said. Battles raged last year, however, with Sun's announcement of the Wabi Windows-on-Unix interface and the creation of the Common Open Software Environment, an alliance of major Unix vendors attempting to fight Microsoft's desktop dominance.

Sun has been bundling its Wabi 1.0 package with Solaris 2.3 at no charge, but since it was announced last May, only 30,000 Wabi 1.0 copies have been shipped, company officials said. Users said some of the 13 Wabi-certified Windows applications performed better than others, but some of them ran too slowly.

SunSoft said Wabi 1.1 "offers significantly enhanced stability and reliability" but did not elaborate. Hewlett-Packard Co. and IBM waited for repairs to be made but will ship Wabi 1.1 code with their Unix workstations soon. [CW, March 28]. Sun ships Wabi 1.1 this month.

Sun's chief technical officer, Eric Schmidt, said the SunSelect unit is incorporating IBM's PCSim technology to handle DOS emulation under Windows. Wabi 2.0 is due this summer, he said, with certified support for 20 Windows packages.

Oil pilot

CONTINUED FROM PAGE 1

Doug Zahniser, a senior petrophysicist at Oryx Energy Co., an exploration and production company in Dallas, said the POSC project proved "you can do an awful lot more with an awful lot less."

The POSC pilot is also in sync with the larger trend to re-engineer oil companies and outsource any function not related to oil production. Users hope to buy more packages off the shelf rather than write custom software.

"This lowers the risk for joint venture," said Rob Merritt, supervisor of exploration information at Elf Exploration, Inc., a subsidiary of POSC member Elf. "We think the future of software development and industry activity as a whole is going to be a cooperative effort."

Technology costs for joint oil exploration could be sharply reduced if companies agreed on common data sets, standard hardware and packaged software, according to pilot project manager Larry Gahagan, a BP Exploration global consultant.

Inefficient data transfer means that "60% of the time [that] geoscientists and engineers spend looking for data and organizing it is not needed," Breed said.

Oil firms routinely share data about drilling sites but usually have different computers and databases in place.

"The exploration side of the energy industry is unique because... these firms share risk together when they're drilling or exploring for oil," explained Eddy Fikse, the Dallas-based partner of Andersen Consulting who is in charge of the firm's Americas Energy practice. "So there is a need to share information. The success of POSC is going to be based on whether or not they can get the software vendors and information providers to accept their standards."

Industry pilot group. *Front row (left to right): Howard Chan, Shell, William Costello, Focal Point Software. Back row (left to right): Chris Colen, Cap Gemini America; Cary Purdy, POSC/Mobil; Doug Zahniser, Oryx Energy Co.; Larry Gahagan, BP; Gerard Huard, Elf Aquitaine; Mary Adams, Cap Gemini America.*

Winning over vendors

Indeed, the next step for the 80-member POSC consortium of oil firms, computer firms and government agencies is a program to persuade software vendors to port packaged applications to the POSC pilot standards.

All of the information technology infrastructure built in the 1970s and 1980s — when oil was selling for more than $20 a barrel instead of the $13 today — is now subject to revision, re-engineering and outsourcing, users said.

Information technology "is under a lot of pressure — so much so that there is a need for us to be able to network smarter and to take full advantage of the data resources within the company," said Michael Zeitlin, team leader of visualization technology at Texaco Corp.'s headquarters in Houston.

While large oil companies still widely use IBM mainframes and networked PCs for administration and marketing, several POSC members said they have already started slashing budgets by shuttering mainframes and supercomputers in favor of Unix systems and workstations.

"There's no doubt the No. 1 reason for going to Unix and open systems is you have a much cheaper processing platform," Fikse said.

Unix systems let information systems managers harness distributed computing resources scattered on corporate networks, he said.

Open systems revolutionizes BP Exploration

BP Exploration's sprawling global information technology infrastructure has already been transformed by open systems.

An active member in POSC, BP Exploration cut its information technology budget from $360 million a year in 1989 to about $110 million in 1993. It did this by outsourcing, moving to Unix systems and using packaged software.

The firm cut its information technology staff from nearly 800 in 1989 to about 150 now, according to Glenn Breed, a former BP Exploration executive and a POSC co-founder.

Breed said the firm had hundreds of Digital Equipment Corp. VAXs and two Cray Research, Inc. supercomputers in the late 1980s. However, the acquisition of two other oil firms forced a wholesale re-engineering of all of BP Exploration's information technology systems and business units in order to reduce costs and wipe out duplication efforts.

Reducing costs

The overhaul reduced information technology costs by more than 50% in a business that operates on six continents and employed about 8,000 in late 1993. Key information technology sites are in Anchorage, Alaska; Aberdeen, Scotland; and Houston.

"Legacy systems really don't pay their way anymore," said Larry Gahagan, a BP Exploration global consultant who managed the POSC pilot project. Many of the legacy applications were migrated from minicomputers and supercomputers to Unix systems, including hundreds of IBM RS/6000 workstations.

For example, at BP Exploration Alaska in Anchorage, much of the modeling once done on a Cray Y-MP supercomputer for oil-reservoir simulation is now done on clustered RS/6000s. The same site also has Sun Microsystems, Inc. SPARC 10 servers and Hewlett-Packard Co. workstations. Custom programming is mostly gone.

"We have to buy off the rack, and we want it to integrate," Gahagan explained. "Our strategy is to buy and not customize." — *Jean S. Bozman*

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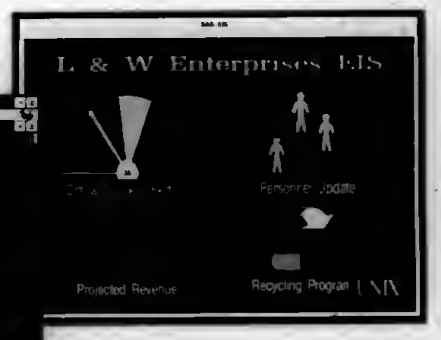

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Computer viruses. Perhaps the most misunderstood computer security issue in America today.

Throughout the mid-80s and early 90s, the computer and business press were filled with horror stories about viruses and the dreaded possibility that one day a "killer virus" would bring America's critical computer networks crashing down.

The fear rose and escalated until it peaked with the announcement that the Michelangelo virus would race across America's networks overwriting hundreds of thousands of hard drives.

Then, nothing happened.

Michelangelo turned up on the national news but just about nowhere else. People began to dismiss viruses as hype. The media and MIS turned their attention to other issues.

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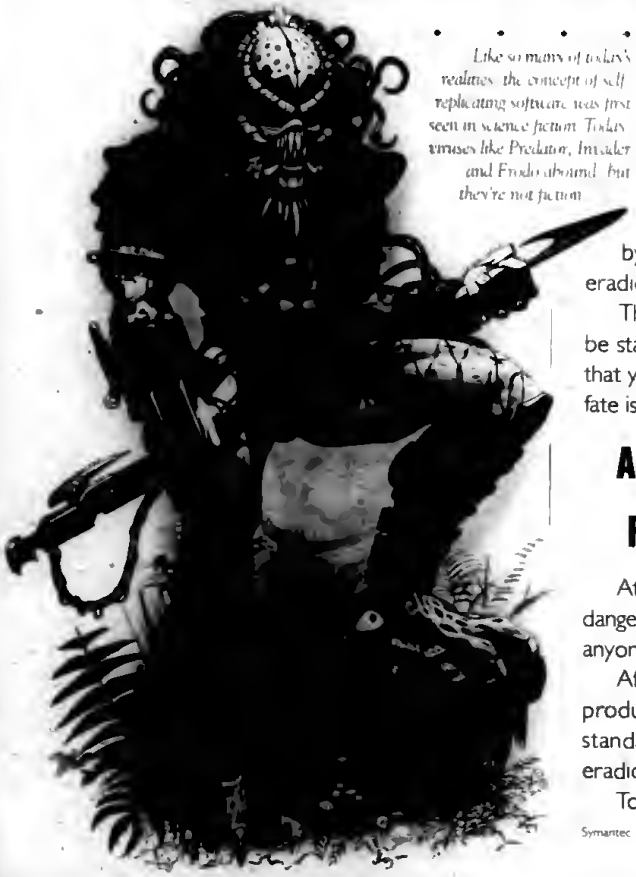

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Wang ships Windows document management

By Mary Brandel

Wang Laboratories, Inc. is hoping to make a splash in the small but burgeoning Windows-based document management market with Open/Profound, an entry announced last week.

Open/Profound is a new version of Lowell, Mass.-based Wang's DOS-based product that supports Windows-based clients, Hewlett-Packard Co.'s HP/UX and IBM's AIX servers and Novell, Inc. and Banyan Systems, Inc. LANs.

"Document management is the next big LAN application," said Ann Palermo, an analyst at International Data Corp. in Framingham, Mass. "Corporate America is waking up to find that their document information is as important as their financial data."

Users who are employed in paper-intensive environments such as law and publishing have used document management products for years to help locate and track documents distributed enterprisewide. Now, more general-purpose office users are beginning to take notice as products emerge.

Vendors that are already "way ahead of Wang," even among law users, are Saros Corp., Softsolutions Technology Corp. and PC DOCS, Inc., according to Frank Gilbane, editor of "The Gilbane Report," a newsletter in Arlington, Mass.

A key asset of Wang's offering, according to analysts, is its integration with Open/Image, Wang's Windows-based imaging product. With this integration, users can track not only word processing and spreadsheet files but also paper-based documents that are scanned into the system and treated as images.

Market doubles

IDC says the 1993 document management market was $100 million, double that of 1992. It expects the market to double again this year.

Analysts see this as a strong move for Wang. "The lines between image and document management are blurring," Palermo said.

Imaging integration interests Ted Johnson, a partner at Morris, Nichols, Arsht & Tunnell in Wilmington, Del., one of the largest law firms in the state. "We get 200 to 300 [external] documents per case," he said. If the firm could image those documents, "attorneys could read the extracts and click an icon to bring up a particular image, including handwritten notes in the margins, which are sometimes the most important part," Johnson explained.

What the product offers

Runtime software for Open/Image is available for each client at no additional cost. According to Wang, no additional programming is required to access Open/Image within Open/Profound. A Wang spokesperson said the company is considering integrating Open/Profound with Open/Workflow, Wang's workflow offering. But no such integration is included in the current version.

So far, Open/Profound offers tight integration with a short list of PC applications, including Microsoft Corp.'s Word for Windows and Excel, WordPerfect Corp.'s WordPerfect for Windows, Lotus Development Corp.'s 1-2-3 and several leading electronic-mail packages. It does not support Macintosh clients.

In terms of product improvements, Johnson said he would like to see Wang include a better viewer. "Profound brings up a list of documents that meet your search terms but not the text documents. You've got to bring those up in another program," such as a word processor.

For current Profound users, Wang is offering a special promotion of $149 (for client software) through the end of June. The regular list price is $295.

For volumes of 50 and up, a Wang configuration would cost $14,045 (PC LAN server) or $15,745 (Unix server), including a proprietary database.

In comparison, Saros would cost $24,750, including a proprietary database, and PC DOCS would be priced at $20,445, with a runtime version of Oracle Corp.'s or Sybase, Inc.'s database.

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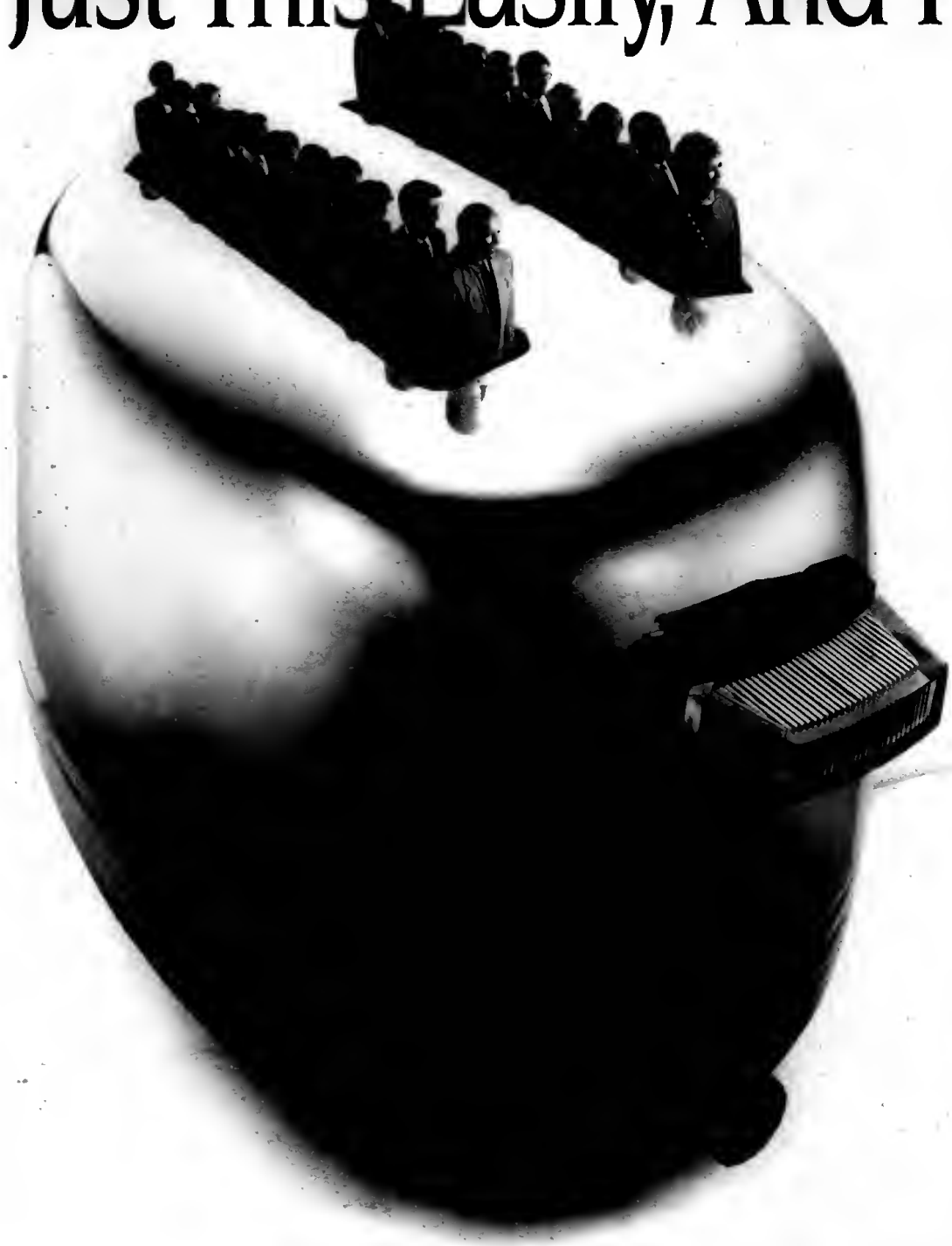

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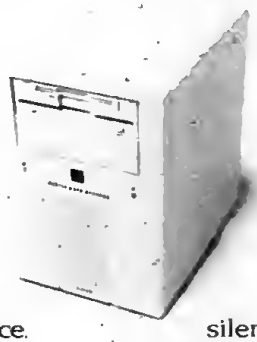

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Development tools

Low-end client/server tools may fuel price war

By Melinda-Carol Ballou

Developers can look forward to lower costs in the low-end client/server tools arena, where KnowledgeWare, Inc. upped the ante last week with the announcement of ObjectView Desktop. The product will bundle the company's visual tools with a single-user version of Gupta Corp.'s SQLBase and other database and middleware drivers.

The lowball pricing of the KnowledgeWare tools — starting at a discount price of $199 — is likely to drive down the overall prices of the higher-end, enterprise-wide versions of the tools. This could ultimately lead to a market shakeout, industry observers said.

Pricing wars

The list price for PowerBuilder Desktop will be $645 after June 1, and the final price for ObjectView Desktop will be $499. The higher-end versions of PowerBuilder, KnowledgeWare's ObjectView and Gupta's SQLWindows are priced respectively at $3,475, $3,200 and $3,795.

Powersoft Corp. last month released a desktop version of its PowerBuilder tools [CW, Feb. 21] at a discount price of $245, and Gupta is expected to provide a comparable offering by the summer for less than $1,000, industry sources said.

PowerBuilder Desktop includes subsidiary Watcom's database. Unlike the KnowledgeWare product, however, the PowerBuilder product does not offer drivers to other databases, such as Oracle Corp.'s, or middleware drivers to Microsoft Corp.'s Open Database Connectivity or Information Builders, Inc.'s EDA/SQL.

The bundled drivers in ObjectView Desktop will give desktop developers the ability to link their applications to other corporate databases, KnowledgeWare officials said.

'Lite' environment

ObjectView Desktop will let programmers create stand-alone desktop applications with graphical user interface (GUI) support and more robust capabilities than those available with Borland International, Inc.'s dBase and generic clones, some developers said.

"The biggest advantage of ObjectView Desktop will be for individual departments at our company who don't want the more complex development requirements of the full version of ObjectView with Sybase or DB/2," said Mark Brandt, supervisor of administrative services at Union Electric Co., a utility in St. Louis.

He added that ObjectView Desktop will allow those groups to create a front end to their Clipper applications with event-driven capabilities and GUI-based Windows support.

Union Electric has already benefited from pricing battles. Earlier this year, contract costs of more than $100,000 sank to about $30,000 after KnowledgeWare cut prices for ObjectView 2.1, Brandt said.

"KnowledgeWare has thrown down the gauntlet not only to Powersoft but also to the dBase vendors — I think the world may be ready for packaged client/server power tools with a prototyping database," said Don DePalma, an analyst at Forrester Research, Inc., a consulting firm in Cambridge, Mass.

But users may question the need to pay more for the full-fledged, higher-end tools, DePalma added.

ObjectView Desktop will ship this month, and native database drivers for Oupta's SQLWindows will ship by September. Ten-pack licenses for SQLWindows will be available from KnowledgeWare for $1,000. For those who seek to move beyond stand-alone environments with SQLBase, multiserver SQLBase support will be available from Oupta starting at $999 for five users.

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IRS turns to imaging

CONTINUED FROM PAGE 1

The IRS has made imaging and image character recognition — in which typed and handwritten letters and numbers are extracted and interpreted from previously scanned forms — a cornerstone of its 10-year, $8 billion Tax Systems Modernization project.

But in recent years, skeptics, including the General Accounting Office (GAO) and the National Research Council, have said the IRS may be indulging in wishful thinking where technology is concerned. In 1992, a GAO official told a congressional panel, "IRS' input processing strategy appears to be a high-tech, high-risk and high-cost venture for which IRS has not done the necessary homework to justify committing nearly $3 billion."

Coleta Brueck, *head of IRS imaging, said the IRS' faith in automated character recognition has been justified so far*

Threat of electronic filing

The GAO and others have also questioned whether the agency's attempts to move the public to electronic filing might prove successful enough to render the paper-imaging systems uneconomical.

"The assumption with the [imaging] systems is that the IRS will be dealing predominantly with paper forms 15 years from now," said Steve LeCompte, group director at IDC Government, a market research and consulting firm in Falls Church, Va. "If they had instead invested in electronic filing systems, where would they be in 10 to 15 years?"

Coleta Brueck, who heads the IRS' imaging efforts, said vendor demonstrations have proved the accuracy and cost-effectiveness of existing technology. She also noted that electronic returns are not likely to make a big dent in paper any time soon.

Testing a new system

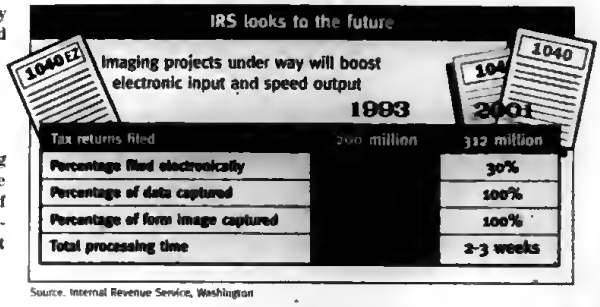
In February 1993, the IRS awarded an $88 million contract to Grumman Corp. to build the Service Center Recognition/Image Processing System (SCRIPS). A pilot version went into operation at the IRS' Cincinnati processing center this year and will begin processing 1993 tax forms next month.

At each center, SCRIPS will be able to scan 17,000 tax forms per hour, read and recognize typed and handwritten characters from the resulting image, check math and store an image of the form. It will handle six one-sided forms, including the 1040EZ and Form 941.

And in February this year, the IRS awarded a 15-year, $1.3 billion contract to IBM Federal Systems Co. — since acquired by Loral Corp. — for the far more ambitious Document Processing System (DPS). DPS will scan 286 kinds of forms, some two-sided and each with multiple variations [CW, March 7].

After being scanned, an image is stored on optical disc, eliminating the need to warehouse tons of paper every year. A second snapshot is processed further to delete preprinted form information, leaving just the data entered by the tax filer to be interpreted by one or more character-recognition schemes (see story below).

DPS is scheduled to be installed at the Austin, Texas, processing center next year and at four other IRS centers by 1998, replacing the manual data entry now performed at 10 service centers. By 2001, DPS will process 312 million tax and information returns annually and will perform data validation on 60 million returns filed electronically, according to the IRS (see chart).



Source: Internal Revenue Service, Washington

Manual workers: Set free at last

The IRS' new electronic imaging and character-recognition systems are expected to free up several thousand people in manual processing each year, some of whom will be redeployed to enforcement, collections and other revenue-producing activities. The IRS hopes to raise the rate of voluntary compliance from 82% to 90%, with each percentage point worth $7 billion. However, that is only partly due to imaging systems. The balance comes from other systems and re-engineering efforts.

Brueck said the IRS' faith in automated character recognition has been justified so far. She said SCRIPS is getting a "data capture success rate" of 96% for handwritten numerics and that preliminary benchmarks suggest DPS will hit similar rates of accuracy.

Brueck said error rates would be higher for alphanumeric data, but tests have not yet pinned that down.

"There were some reasonably challenging test demonstrations that the two DPS bidders had to go through," LeCompte said. "IBM passed them, and the other team could not." He said a handwriting-recognition technique developed at an IBM laboratory gave it the edge.

System pays off at any level

Regarding the suggestion that widespread use of electronic filing options might render the paper-pushing DPS an expensive white elephant, Brueck said an IRS analysis showed the system would pay for itself at any conceivable level of paper input, mostly due to elimination of sorting, numbering and batching forms, data keying and storage and retrieval of paper.

Currently, only 40% of the information on a tax form is keyed, Brueck noted. Even in the IRS' use of optical character recognition (OCR), no complete electronic image of the form is made. When a dispute over a return occurs, the IRS can spend weeks retrieving the original document, something Brueck said will be achievable in seconds or minutes with electronic imaging.

Tax man finds better way to reach data trove. See page 65.

Reading the writing on the form

Automated character recognition is considered one of the tougher jobs in computing. But IRS contractors say the key to successful machine reading of tax forms is knowing what information is critical and what is not, as well as knowing which technique is best applied in each situation.

Tim Bradley, DPS program manager at Loral Federal Systems in Gaithersburg, Md., said DPS will achieve very high accuracy on critical numerics such as a $3,000 figure entered into a field for capital gains. It would be less likely, but also less important, to get every character right in the handwritten company name associated with that $3,000.

Bradley acknowledged there will be the occasional basket-case form, such as a "copy of a copy with coffee stains," but said that less than 1% of all forms will require completely manual data entry.

Some of the critics of the IRS' plans for automated data capture simply do not understand the proposed methods and their economics, Bradley said. "You get a lot of manpower savings even if you only get 50% of the characters right," he said.

Yet that does not mean getting the other 50% wrong, he added. User-controlled tolerances in the software will be set with a bias toward rejection of ambiguous characters. By contrast, many commercial systems are set up to make a best guess in doubtful situations.

Bradley said DPS' high recognition rates are due in part to its use of four "OCR engines," each with strengths and weaknesses on different classes of problems. Every form will go through at least two and possibly three of the software engines, offering multiple chances of recognition and error detection.

"We deliberately looked for engines with as diverse a view as possible," Bradley said. For example, one engine might look at characters as collections of lines and circles while another looks at pixel patterns. Each engine can be weighted to give it priority in situations in which it excels.

While character-recognition algorithms have improved somewhat over the past three years, the biggest advancement has been in the use of "contextual knowledge," said Richard Fenrich, senior research scientist at the Center of Excellence for Document Analysis and Recognition (CEDAR) at the State University of New York at Buffalo.

For example, Fenrich said, with SCRIPS, the filer's name and address go through a routine developed by CEDAR that uses context supplied by a national address database. If the recognition routine incorrectly reads an address as "ALLEN, MU 01970," by cross-referencing with the database it could infer that it most likely should have read "SALEM, MA 01970."

—Gary H. Anthes

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Briefs

Data General lays off

As part of what it called "an ongoing process," Data General Corp. has laid off some 200 salespeople nationwide, according to a source close to the company.

DG would not confirm the number of layoffs or which product lines or job titles were affected. "We're keeping costs in line with a competitive marketplace," a company spokesman said.

"I wouldn't be surprised to see DG move toward [a head count of 5,000]," said Jonathan Eunice, an analyst at Illuminata in Hollis, N.H. That is down from 6,350 at the end of December, according to the DG spokesman.

AMD up 38%

Chip maker Advanced Micro Devices, Inc. was cheered by continued strong demand for PCs last week, as it reported earnings that shot over Wall Street estimates. Analysts said they hoped AMD's robust bottom line was a sign of a financially solid high-tech spring for computer parts makers. AMD showed a profit of $84.6 million, or 85 cents per share, for its first quarter — an increase of 38% over the same quarter a year ago.

ASK woes continue

ASK Group, Inc. announced last week that it would take a $45 million to $47 million restructuring charge for its third quarter, ended March 31. The Santa Clara, Calif., software vendor has had slumping sales this year and is taking the charge to reflect expenses from facility closings, staff reductions and asset write-offs.

SHORT TAKES Remote access vendor IWI in Mountain View, Calif., has changed its name to CommVision Corp.... Distributed systems management vendor OpenVision in Pleasanton, Calif., has a new senior vice president: Helen Bradley, formerly a system software vice president at Sun Microsystems, Inc.

Symantec to purchase rival

Central Point will help company focus on selling enterprise tools to IS managers

By William Brandel

The PC utility vendors' buyout spree appears to be nearing its end.

Symantec Corp. in Cupertino, Calif., last week said it intends to purchase industry rival Central Point Software, Inc. in Beaverton, Ore. The buyout will leave few independent utility vendors in the PC market.

The acquisition, which the Securities and Exchange Commission and the Justice Department must review, will be achieved through a stock swap worth 4 million shares, or an estimated $60 million. With the purchase, Symantec will garner Central Point's PC utilities for DOS, Windows, OS/2 and Macintosh systems, in addition to a number of PC LAN utilities (see chart).

Pooling resources

The thrust of the merger will focus on pooling the two companies' network administration tools. Symantec officials said the company is now positioning itself as an enterprise tools vendor and targeting information systems managers.

To wit, Symantec is rolling out a new SQL-compatible project control application this week. Symantec officials contend that their Timeline 6.0 product is the first example of a new breed of enterprise-level utility offerings. Consultancy Gartner Group, Inc. said this market has reached only 12% of its potential.

Central Point will serve as the PC utility unit of Symantec, a Central Point spokeswoman said.

More than 100 employees of Central Point's 280-person staff — most in administrative roles — will lose their jobs as a result of the consolidation, she said. Central Point's chief executive officer and chairman, Chuck Boesenberg, will stay on to oversee the transition, the spokeswoman added.

The government must first review the merger under the guidelines mandated in the Hart-Scott-Rodino Act. This antitrust ruling comes into play because the merger essentially involves combining the Top 4 PC utility vendors.

Just last November, Central Point purchased XTree in San Luis Obispo, Calif. In June 1993, Central Point also bought the LANlord utility from MicroCom in Norwood, Mass. Symantec purchased Norton Utilities in 1990.

Housing it all

The Symantec and Central Point merger brings many networking software products under one roof

Symantec's products

- Norton Administrator for Networks
- Norton AntiVirus for NetWare
- Norton Utilities Administrator
- Norton DiskLock Administrator

Central Point's products

- Central Point Anti-Virus for NetWare
- XTree for Networks
- XTreeNet
- NetControl
- LANlord

Without a hitch

"Even though this involves the pooling of the Top 4 utility vendors in the market, we expect this merger to go through," said Carter Lusher, program director for PC computing at Gartner Group in Stamford, Conn. "These merged companies are still relatively small compared to the emerging tool vendor on the market: Microsoft."

Outsourcers sharpen re-engineering skills

CSC hires former consulting exec to head practice

By Mark Halper

■ In an age of convergence — of data and telecommunications, televisions and computers, banks and securities firms — the outsourcing industry is going through a consolidation of its own.

A flurry of recent activity has underscored the entwinement of outsourcers with the business process re-engineering crowd. More than ever, outsourcing vendors are trying not only to sell computing services, but also peddle advice on how companies should regroup themselves into lean machines of empowered individuals using technology and modern business processes.

Thomas Madison, *CSC's new outsourcing chief, comes with a re-engineering background*

Strong combination

Computer Sciences Corp. (CSC) drew attention to the synergies between the industries two weeks ago when it named a former consulting industry executive, Thomas Madison, to head its commercial outsourcing practice [CW, April 4].

"Outsourcing is evolving to where it includes taking responsibility for the complete business process itself," said Madison, who before joining CSC was managing director at Sogeti Group's North American consulting operation. "You've got to have access to management consulting expertise and re-engineering expertise."

Also recently, client/server integrator and business re-engineering firm BSG Corp. formed a joint venture with the Dutch data center outsourcer and information services provider, Philips Communications & Processing Services. And Hewlett-Packard Co. launched a business process re-engineering unit just three months after it christened an outsourcing practice.

This melding of industries is not new. Outsourcers such as Electronic Data Systems Corp., CSC and IBM's integrated Systems Solutions Corp. (ISSC) subsidiary have long had consulting adjuncts and subsidiaries. Over the years, Andersen Consulting has run an outsourcing practice with varying degrees of earnestness.

Another example is the $500 million outsourcing deal ISSC won last week with Amtrak, which called for ISSC to undertake a re-engineering study of the passenger rail line's reservations and ticket revenue collection processes, according to Don Gentry, Amtrak's vice president of information systems.

At the same time, Amtrak has a broader companywide re-engineering study under way, Gentry said. "There will be a very close relationship between the new developments we take in IS and the re-engineering efforts," he noted.

ISSC President Sam Palmisano said his firm is working with IBM's consulting group to derive re-engineering ideas for Amtrak.

Ready to commit

At CSC, the appointment of Madison accentuates the consultancy's commitment to business consulting. Madison said he will help integrate into outsourcing deals the multifaceted consulting services that CSC already offers through its Cambridge, Mass., CSC Consulting Group.

In comparable past moves, EDS last summer hired former Coopers & Lybrand Management Consulting Services Group managing partner H. Michael Gleason as corporate vice president in charge of worldwide consulting operations. And Peat Systems Corp. added change management author Richard Pascale to its advisory board.

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As the world turns

The morning after the Novell/WordPerfect deal last month, I was having breakfast with a software executive from a respectfully sized company.

"It used to be," he said, "that reaching $100 million in sales meant you were a serious software company. Now I wonder."

Industry observers are subsequently wondering, too, just what is happening to that club known as the PC software industry. Suddenly it seems that software companies are conglomerating like iron filings on a bar magnet, drawn into shivering masses in fear of the Microsoft monster.

Customers are also beginning to wonder. Is the freedom of choice made possible by the existence of multiple suppliers about to be curtailed? Will the members of the burgeoning oligopoly do what they do best: drive up price and drive out innovation?

Jeez, you'd think the world was coming to an end. I suppose it is for some, like the software company founders selling out to the bigger players. But what a way to go — the co-owners of WordPerfect together split more than $1 billion from the sale. Take me, take me.

Well, the world is not coming to an end. Not only that, startingly similar consolidations a decade ago offer a vision of what is likely to happen now.

Remember Cullinet, Morino Associates, ADR, Duquesne, Uccel, MSA, McCormick and Dodge and Software International? They and many other solid large systems software companies disappeared into bigger companies (again, making the founders of acquired companies quite rich). This thinning of the herd resulted in bigger players — some thought scary players — that would dominate the industry.

However, product innovation continued apace. And in time, prices actually dropped. In fact, the number of software companies grew.

Why? Because consolidation typically occurs in relatively mature market segments. Large systems software was a mature technology segment 10 years ago, and so are the PC applications around which this current consolidation has revolved.

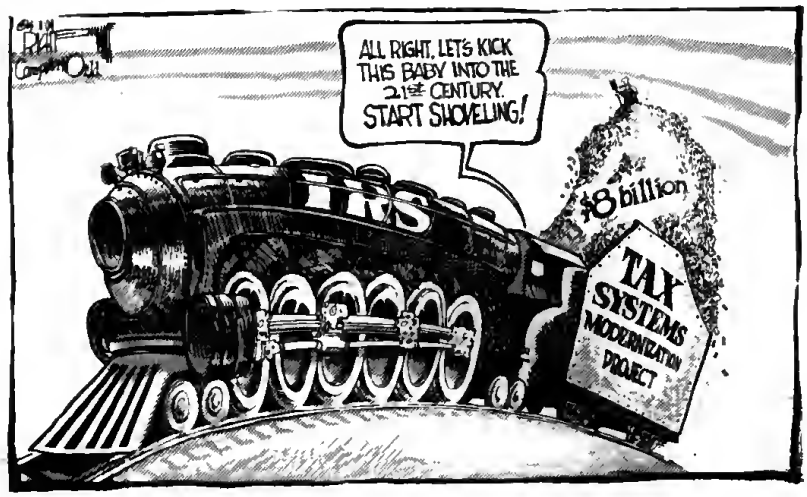
Also, the thinking a decade ago was that then-forming conglomerates would leverage tremendous resources to dominate the growing PC market. That clearly did not happen. Nor will any one PC company — Microsoft, Novell or Lotus — by virtue of its mass necessarily dominate the markets emerging today.

The hard lessons of the computer industry have shown over and over again that sheer mass carries its own built-in limitations, such as the inability to foster the kind of entrepreneurial spirit and innovation that remain the essence of the business. This leaves ample room for start-ups and niche players that can grow big and important very quickly. Like Powersoft. Like Gupta. Like Cisco. Like Wellfleet.

No, the world's not ending. It is just changing and in some predictable ways.

Bill Laberis

Bill Laberis, *Editor in Chief*



Faults not fatal

In "Responsible lawsuits keep vendors honest" [CW, March 28], Bruce A. Bierhans characterizes the demise of a financial institution as a result of "a faulty turnkey computer system."

While enterprisewide computer solutions can easily top the price of a corporate jet, rarely do companies ensure computer competence the way they would pilot competence. On the other hand, if user errors were as fatal as pilot errors, users would probably get better training. Of course, that would probably attract more ambulance chasers.

Matthew Conescu
Atlanta

No free rides

I can only quote one sentence from Karl Marx, but that is enough to debunk the contention of Jeffrey Gordon Angus that "free" (it isn't) support is a socialist concept ["America's socialist backlash," CW, March 7]. The full quote is "From each according to his abilities, to each according to his needs."

Software support charges are not based on ability to pay; they are the same for each unit of software. Large companies making bulk purchases actually pay less. The concept here is not similar to socialism but to insurance. I and most other drivers will pay a hefty sum for auto insurance this year and, I hope, need nothing in return. Yet a very great deal of money will be handed to me if I do need it.

A very capitalist company makes a capitalist profit selling this service to me.

The capitalist system will bring back software support that is included with the basic price — but I don't agree that it is "free," any more than my auto insurance is.

Roy Brander
Calgary, Alberta

Idea of Microsoft plot is 'nonsense'

I was surprised to read a *Computerworld* story attributing incompatibilities between Microsoft's recent Windows 3.11 upgrade and IBM's OS/2 for Windows to a Microsoft plot to undercut OS/2 sales ["Windows 3.11 incompatibility angers IBM," CW, March 14]. Nonsense! This Windows upgrade simply represents Microsoft's desire to deliver drivers that were not available when Windows 3.1 shipped.

The paranoia attributed to an IBM official in this story is unwarranted. Somebody give that man a valium! OS/2 for Windows is a fine product and needs no apologists. If Microsoft really wanted to sink OS/2, its programmers could easily come up with something far more lethal.

Carole Pattan
Mendham, N.J.

We're both right

Please allow me to add a thunderous "Amen!" to Marc Dodge's column ["The mainframe is dead, but so is the PC," CW, March 28]. I have been involved in mainframe applications programming, systems programming and support for more than 30 years and in the past eight years or so have added PC support experience. My reaction upon reading that column: "I knew that!" I just didn't know which words to use to say it.

Mr. Dodge has hit the nail precisely on the head, with eloquence. And just as he indicates in his final sentence, *I'm* right!

Robert F. Weber
New Philadelphia, Ohio

Not my kind of town

When Microsoft first introduced its vision of the operating system of the future, it called it "Cairo." It said, "All roads lead to Cairo," whatever that means, but its first step in the journey was Chicago.

Calling Windows 4.0 "Chicago" may have been funny at first, but now I find it sickening.

Enough is enough! The joke is no longer funny. Let's start calling products by their real names again and leave the dopey code names to the insiders.

Everett McKay
Albany, Vt.

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The "V" word

Michael Cohn

I've been asked by my colleagues to make one final appeal To customers everywhere: Stop using the "V" word! Sadly, just a few years ago, we didn't mind the V word. Back then, vend . . (oops, I almost said it) made big money. We wielded huge expense accounts. We got profits, customers got mugs, and everybody was happy.

But nowadays, we've vacated the V word. Read our ads. Listen to our pitch men. We've re-engineered the term Do not use the V word. Today's customers should refer to us by one of our new warm and fuzzy, touchy-feely, revenue-generating titles. We've created dozens of them, and no two are exactly alike. Sure, it gets confusing, so for you rookie customers out there, let me explain what we mean by each one.

Systems integrator — We'll make all your computers work together . . as long as you bought 'em all from us.

Hardware provider — What we are when you need to get the most out of your capital budget.

Services provider — What we are after you've run out of capital budget.

IS visionary — We'll forecast your future, put you on the right strategic path and position you to use IS for competitive advantage . . all, quite coincidentally, just before our fiscal year ends.

Systems consultant — Our title once we have completed a difficult technical engagement

Management consultant — Our title once we've botched a difficult technical engagement.

Technical adviser — We'll tell you how to buy our products.

Financial adviser — We'll tell you how to *lease* our products.

Contractor — That's when we do a specific task in a specified time frame for a specified price.

Subcontractor — That's when we do a specified task in a specified time frame for a specified price . . then get the heck out of Dodge.

Entrepreneur — Someone who markets a leading-edge, open-architectured, object-oriented, full-function, revolutionary new GUI application . . . then delivers just the prototype.

Data and network specialist — Our moniker when we provide the tools and products to manage all the data in your enterprise.

Network specialist — Our moniker after we've lost all the data somewhere in your enterprise.

Niche solution provider — We focus on one thing and do it well.

Total solution provider — We focus on a bunch of things, hoping we'll figure out how to do *one* well.

Partner — We approach you with open arms, asking you to invest in an honest, long-term relationship . . . because maybe by then, we'll have come up with something.

Go with a warm and fuzzy, touchy-feely term instead of the V word.

Cohn once worked at a huge computer company and now works at a small computer company. Unfortunately, it's the same company

Novell's chance at the brass ring

David Coursey

What to make of Novell's acquisition of WordPerfect and Borland's Quattro Pro? Much of the news coverage of the deal has missed the point — and Wall Street's pummeling of Novell's shares doesn't impress me either.

Novell bought WordPerfect because Ray Noorda woke up and realized his notion of "co-operative competition" had reached a limit. It was a hit like the defenders of the Alamo deciding that their pacification program wasn't having much effect on the Mexican troops. Given that failure, the next step is probably warfare, which is where Novell is rather belatedly headed.

My guess is Novell will fare better than Davy Crockett, et al., but the outcome of the Novell vs. Microsoft fight isn't obvious. At the start of round one, any sensate being would give the Redmondians a clear advantage.

Back to that after a brief history lesson. Remember Pete Peterson, WordPerfect's maximum leader? Pete got cashiered — a British term I've come to favor — because he created a one-product company around what had been the world's greatest word processor.

Pete's problem was that competition changed, and people stopped caring about word processors so much. It also didn't help that, like Lotus, WordPerfect hoped to slow Windows by betting on OS/2. The success of Windows 3.0 sent developers at both companies reeling while Microsoft surged ahead.

So, while WordPerfect struggled with databases, spreadsheets, E-mail and OS/2, Microsoft built a suite of applications that worked pretty much alike and worked together.

WordPerfect was, effectively, surrounded by Microsoft. Things weren't looking good for WordPerfect. Owners Bruce Bastian and Alan Ashton fired Pete and brought in new people to rev up marketing, . . turn WordPerfect Office into a real E-mail contender and salvage the company.

To the extent possible, CEO Ad Rietveld, brought in from WordPerfect's European operation, repositioned the company in a matter of months. Early results looked good, but we'll never know how things would have turned out. Rietveld negotiated the deal with Novell, allowing Bastian and Ashton to cash out, while Rietveld himself advances to Novell's executive suite. Pass go, collect $1.4 billion, less if Novell's stock doesn't firm up.

The reason for this history lesson is that Novell is further up the same road that led WordPerfect into the ditch. The reason for WordPerfect's problem was that the competition changed. Microsoft upped the ante so that single applications could not compete with interlocking applications.

Tomorrow, interlocking applications won't be enough. Novell's next hurdle will be networked applications, enabled by Microsoft operating systems. Lacking applications, Novell would have found itself like WordPerfect, surrounded by Microsoft.

Instead of death by Microsoft strangulation, Novell gets to fight a few more rounds and has the flexibility to create its own vision of the future. This is good news for most of us but bodes ill for IS managers seeking a return to those bad old days when there was a company big enough to tell everyone what to do.

Novell needs something other than a me-too version of someone else's ideas. It needs to offer an open systems alternative to Microsoft's messaging, database, tools, applications. . . . Heck, if Microsoft is doing it, Novell needs to offer an interoperable alternative based on open standards and scalable architectures.

Novell also needs to do something Noorda has never done: spend money to evangelize its vision. I'm talking about the megabucks Microsoft spends to spread its version of the future. Hopefully, Bob Frankenberg in his new role as CEO can wrest enough control from Ray to free up that cash.

It was a bit like the defenders of the Alamo deciding their pacification program wasn't having much effect on the Mexican troops.

Coursey is editor of "P.C. Letter," a San Mateo, Calif., industry newsletter. His Mr. Mail address is 558-4460

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Access gains speed, functions

Microsoft adds myriad functions to Version 2.0

PRODUCT TEST DRIVE

By Garry Ray

It is rare to see a software upgrade with more than a few major feature enhancements. Microsoft's Access 2.0, released late last month, stretches the boundaries with not just a few but dozens of major enhancements and revisions.

The popular Windows database, which reportedly has more than a million users, now includes the speedy Rushmore query technology from Microsoft's FoxPro database. Microsoft claims query improvements of up to a hundredfold, but we did not see anything on that scale.

Most queries, however, were noticeably faster than identical queries in Access Version 1.1.

Also new to Access 2.0 is Access Basic, which is similar to the macro language embedded in Excel and Word. There is even a decent debugger included in the Access Basic development environment. Object Linking and Embedding Custom Controls support has also been added.

Shortcuts and tips

A host of lesser features have been added to improve general usability. Many of the usability features are similar to those in Excel and Word. Among these are embellishments such as ToolTips (tags that explain the meanings of tool bar icons) and "shortcut menus," which are attached to the right mouse button — nothing earth-shattering, mind you, but enough to bring Access fully into the Microsoft application fold.

Usability is further enhanced with a series of helpful "Builders" for creating and changing macros, queries, menu bars and expressions.

Developers will be sated with a beefier set of programming controls and features. For example, form and report properties can be set and changed during runtime due to the event-driven framework, similar to that of Visual Basic. Access Basic can provide a broad range of control over most Access 2.0 components, including forms, queries, tables and indexes.

Most useful additions

Although SQL functionality has been enhanced in Access 2.0 (for instance, SQL passthrough has been added), most database users will find more immediate utility in the additions to its table and query facilities.

For example, new support for cascading updates and deletes will cut down on programming overhead, as will the new table relationships window. A nice fillip is that tables with matching fields are automatically joined on that field. Tables can be easily sorted with the Quick Sort tool bar.

While most of these changes are likely to appeal to current users, some will likely bemoan the doubling of suggested Windows memory from 4M to 8M bytes.

The benefit to the plethora of new Wizards — 30 have been added for manipulation of tables, queries, controls and forms — is dubious because it raises

Access 2.0, *page 40*

Dynamic RAM

DRAM speed revved

By Michael Fitzgerald

PC hardware is changing so fast that even dynamic RAM, that old reliable system component, is about to go through a dramatic change to keep pace.

NEC Corp. announced 16M- and 18M-bit DRAM based on a new technology licensed from Rambus, Inc. in Mountain View, Calif. The technology promises to transfer data at 500M byte/sec., outperforming traditional DRAM by up to 10 times. Approximately 500M bytes would hold the complete works of Shakespeare 60 times over.

The technology should also help spur much more powerful handheld machines because of the amount of data it can handle. While Rambus DRAM is more costly than conventional DRAM, analysts said its price will drop and that it might reduce redesign costs for system OEMs.

Analysts also said there is a need for Rambus DRAM.

"Everybody's recognized that there's not enough performance with standard DRAM," said Dean McCarron, an analyst at Mercury Research in Scottsdale, Ariz. But it will be perhaps as long as two years before Rambus DRAM prices are low enough to compete with regular DRAM in system design, he said.

First out of the gate

NEC is currently sampling the Rambus DRAM, making it the first company to begin producing a 16M-bit version of the chip. The new DRAM technology probably will not appear in systems much before the end of 1995.

Rambus President Geoff Tate said, "The immediate impact for PCs is superior price/performance for PC graphics," due to the larger frame buffers available in Rambus DRAM technology.

Tate said a number of chip makers outside the DRAM field will also build components based on Rambus technology in fields such as digital signal processing and graphics chips.

NEC will simultaneously build and market not only traditional DRAM and Rambus DRAM but also a technology called synchronous DRAM.

Synchronous DRAM increases data I/O by using a burst-through mode, whereas Rambus has developed a new hardware-level interface that uses a much faster clock — one that runs at 250 MHz.

Cecil Cookie, senior product marketing manager of memory products at NEC, downplayed NEC's decision to support three approaches to system RAM. "There's room for all of them in the market. Each has its selling points," Cookie said. "The DRAM market will continue to split apart, and we see it as an advantage, not a disadvantage, to have a strong position" in different markets.

McCarron, however, said traditional DRAM will probably be supplanted, first by synchronous DRAM because it has an architecture similar to DRAM. Later, when Rambus DRAM becomes more cost-effective, its faster speed should enable it to gain significant market share.

Rambus is not the only player designing high-bandwidth DRAM, and a similar design from another company could win the day. Mitsubishi Electric Corp., for example, has developed a similar approach to DRAM.

With WaveNet, users pay for what they see

By Jaikumar Vijayan

Wave Systems Corp. in New York has announced a hardware-based "information metering and accounting" system that will allow publishers of on-line information services and CD-ROMs to charge users on a pay-per-view basis.

The system, called WaveNet, combines WaveMeter, a chip-based decryption device, with a monitoring technology designed to license and meter information usage at the point of use. The technology frees users from the connection costs of an on-line service or paying for the entire contents of a CD-ROM.

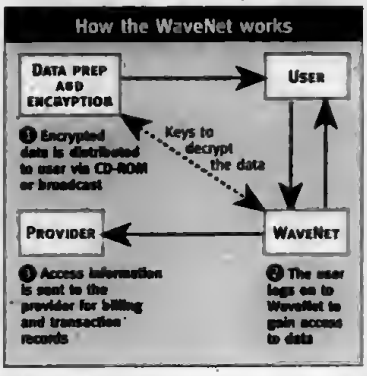
"It's an enabling technology that provides the infrastructure for the distribution of software inexpensively," said Karen Cone, program director of software asset management services at Gartner Group, Inc. in Stamford, Conn.

Concept a hit

Users who have the technology agree.

"You're not spending for on-line time, downloading or printing costs. If you don't use it, you don't pay for it," said David Orenstein, systems director at the New York Law Institute, a beta site for the system.

The cost of a hit is about $25, for instance, to view a report on Pepsico from the Standard & Poor's Corporate 500 CD-ROM, rather than the price of the entire directory, according to Orenstein.



Wave Systems, which developed the system in conjunction with National Semiconductor Corp., is trying to persuade hardware vendors to preinstall the chip on their desktop PCs. The WaveMeter chip validates every purchase request from the user via modem to a back-end license server that contains vendor licensing as well as client information.

It also unscrambles data on an encrypted CD-ROM or electronic feed and automatically creates a billing record of the transaction. A back-end processing network developed by Wave Systems stores the information and forwards it to the information provider. "It is somewhat like a vending machine," said Jay Valentine, vice president and general

WaveNet, *page 40*

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Michael Fitzgerald

Dell it like it is

John Medica, the man charged with resurrecting Dell Computer's notebook business, cups his hands together and offers them to the listener, punctuating his gesture with a "Do y'see?"

Medica's hands hold Dell's future, and he's placing a bet that he can make people see the same trend in the market he does. In a face-to-face meeting, the charismatic Medica can make you see things his way, but his hands can reach out only so far. Beyond that, he has to hope a lot of people buy into his vision or Dell is doomed to be a niche player — or possibly even merely a distributor of other people's products.

What Medica wants the IS buyer to see is that technology is almost unimportant. Instead, what comes with the notebook in terms of packaging, support and services will drive future purchases.

That's not what you'd expect from Medica, the man who gave us the PowerBook when he was at Apple. Conventional wisdom said he'd have to perform technological wizardry to resurrect Dell in the notebook market. So Medica's offhanded statement, "If you see a major technology development from Dell, I'll be surprised," raises eyebrows, either for his piercing insight or for his bland vision.

His argument is that the notebook market is going the way of the desktop market, filled with me-too products and little technological innovation — at least none that offers users a real choice. One could almost say he's describing a future effectively without technology. Not that technology won't exist but that it will no longer be the most important thing to IS buyers.

Remember, Medica works at a company whose most innovative effort in technology was the 320SLt — the first 386-based subnotebook, which ended up a refugee from the Island of Misfit Toys due to some design and component problems. Dell had to recall every one of the sparse number of units it sold, costing it millions.

The 320SLt debacle happened before Medica got there, but "it's a mistake we can't afford to make again," he acknowledges. So of course Dell will pull in its technology horns. Of course it will say technology doesn't matter. If Dell can't do it, it has to argue that it isn't important.

Should IS managers buy this? Or should they skip Dell's offerings — present and future — and put their money on some real technology?

A point to consider

Well, there may be something to Medica's argument.

He points out that the IBM PC Co.'s vaunted ThinkPad, an acknowledged wonder of technology, may have too much technology for its own good. The ThinkPad's hot-to-trot 10.4-in. active-matrix color screen is hard to make, meaning that users give their IBM resellers acid indigestion over supply.

"What good is it to release a great technology product that you can't ship enough of?" Medica asks.

Dear reader, do not be deceived: This question will definitely not send us straight to an existential crisis. Great technology products get vendors noticed. In successive years, AST Research, Apple and IBM have introduced notebooks with great technology and used them to leapfrog other vendors. Technology does matter.

But it may not carry the weight it once did.

Corporate users polled in a recent J. D. Power and Associates survey gave answers that suggest a low-technology strategy might fly in the market.

"Technology is still very important, but as a differentiator it has become less of a factor" than it was, said John D. Power III, president of the poll taker. "No one manufacturer can hit a home run like they used to."

Help from Compaq

Perhaps the main point in Medica's favor comes from Dell's archrival, Compaq. Compaq jumped to first in the notebook market last year despite a starting lineup spearheaded by the creaky LTE Lite, a 2-year-old product design (at least 20 in notebook years). Compaq has worked to offer a variety of services and has beefed up configurations and support to customers.

All markets mature, and Compaq's success may well show that time is having a Ritalin-like effect on the hyperactive pace of notebook technology. That would make it easier for Dell to compete. Medica's plan to be a technology scavenger, looking at other people's ideas and implementing what sells in the market, has drawn approval from analysts.

Perhaps Dell can pull off a slow-tech strategy. This remains to be seen. It may be that the gambit will work only for established technology leaders such as Compaq. All indications are that the LTE Elite, the Lite replacement with the gee-whiz technology feature — a built-in AC adapter with no increase in weight — is selling like hotcakes. Dell may have to come up with something equally innovative to get noticed.

But users should note that technology may be slowing in the notebook market, and more thought and care go to how the boxes get used may be in the offing.

Fitzgerald is *Computerworld*'s senior editor, mobile computing.

Access 2.0

CONTINUED FROM PAGE 37

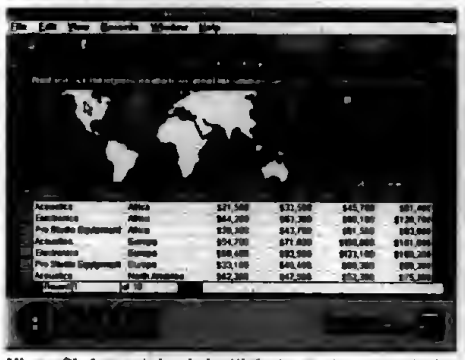
questions about the underlying usability of Access and seems to have some bearing on overhead and performance.

Visual Basic programmers and Access application developers will want to buy the Access Developer's Toolkit, a $495 suite that adds many important features.

Most important is the royalty-free Access 2.0 runtime module, which can be delivered to users along with custom applications. For Visual Basic programmers, the tool kit is also delivered with the Access 2.0 database engine, which can be distributed with Visual Basic applications. The tool kit also includes a help compiler, a setup Wizard to create distribution disks and Windows application programming interface code.

Current users of Microsoft's Access Distribution Kit Version 1.1 and Visual Basic 3.0 for Windows receive a $100 discount on the Access Developer's Toolkit.

For most users, upgrading to Access 2.0 will be an obvious, inevitable and worthwhile choice.



Microsoft's Access *is loaded with feature enhancements, including OLE Custom Controls support and debugging*

Tech firms help U.N. reunite families

By Gary H. Anthes

Information technology is being deployed throughout Europe to help address the largest refugee crisis since World War II and reunite 40,000 children, separated by the conflict in the Balkans, with their families.

The United Nations High Commissioner for Refugees, Electronic Data Systems Corp. and Bull HN Information Systems, Inc. have teamed to develop a system for collecting, processing and distributing information about refugee children among the 4 million people displaced from Bosnia, Herzegovina, Croatia and other parts of the former Yugoslavia.

"This is the first time, as far as we know, that high technology has been used to address a refugee situation," said Barbara Francis, spokeswoman for the U.N. High Commissioner. "We have very high hopes for this system."

In Operation Reunite, refugee profile forms will be completed in the field, then sent to Paris, where they will be keyed into an Oracle Corp. database on a Bull server. Photographs of the children, when available, will be scanned into the database as well.

Requests for information about missing children, sent in by parents on other forms, will be matched against the database in an initial attempt to reunite families.

Then information from the database will be printed out and copied to CD-ROM for distribution to dozens of sites around Europe, where it will be used by U.N. personnel to match parents with their children. Parents at these "consultation centers" will be able to automatically search the CD based on the descriptions put into the system and will be able to view the photographic images on-line.

Some of the paper listings will be tailored by geographic region and sent to local radio and television stations for broadcast.

Reunions expected soon

Francis said data on 500 children is in the database now, and the U.N. hopes to have completed its first "family reunification" in two to three months, when information about 3,000 children will have been loaded.

"As children, we all remember the fear and insecurity we felt when we were separated from our parents, especially in times of distress," said Axel Leblois, Bull HN chief executive officer, in a statement pledging support for the effort. "Few of us can imagine the concern, fear and deep sense of loss that the families separated by this conflict are going through every hour."

Document processing in Paris will occur on a LAN populated by a Bull Unix-based DPX20 server and Bull i486-based PCs. The computers will run Bull's ImageWorks, a suite of development tools for document management and workflow applications.

Users will see a C application developed by EDS that is built around software from Fulcrum Technologies, Inc. for information indexing, searching and retrieval.

The U.N. said it will hire unemployed computer science students and graduates in Zagreb, Croatia, to do field installation, support and data distribution.

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David McGovoran, Alternative Technologies:
"The new Informix database server architecture will put the vendor ahead of competitors Oracle and Sybase in support of multiprocessing systems."

Rob Thoiomeier, Meta Group:
"Informix may have the best scalable server technology today...I think people are mistaken in not taking the time to really look at Informix."

Gordon Kerr, VP, Information Systems, Hyatt Hotels and Resorts:
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Michael Bloomberg, Bloomberg Financial Markets:
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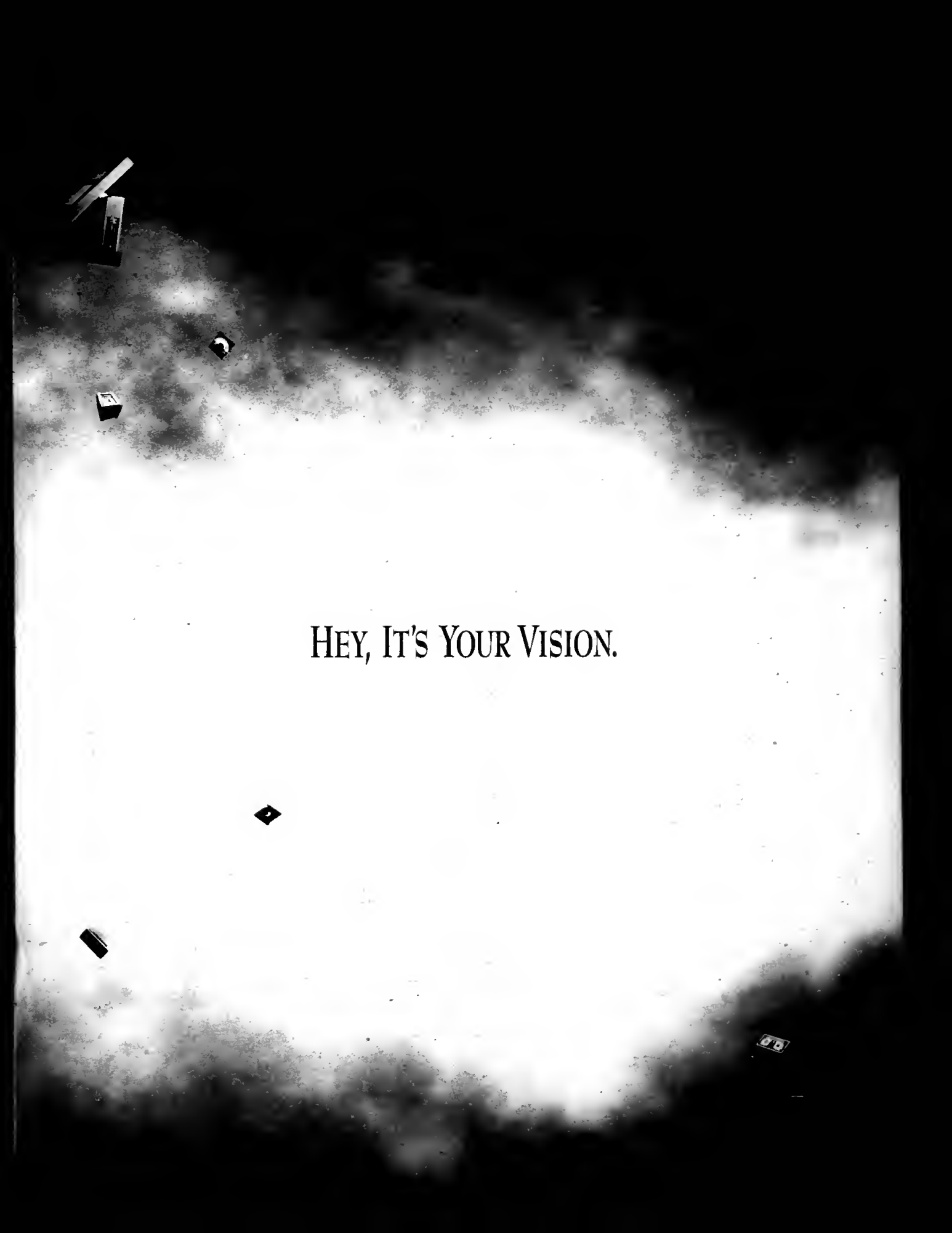
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WaveNet: Pay for what you see

CONTINUED FROM PAGE 37

manager at Wave Systems. "You choose what you want and pay for it."

The system, according to Valentine, integrates hardware-based security as well as automated reporting and credit management services.

Uphill battle

Wave Systems now has to convince information vendors and hardware manufacturers to use its technology.

According to some analysts, the relatively small number of desktops with CD-ROM drives and the consequent low availability of business applications on CD-ROMs could inhibit immediate user interest. "The cooperation of hardware vendors will greatly facilitate deployment of the technology," Cone said.

Information available on CD-ROM "in terms of the percentage of all software is still very tiny," according to Larry Lueck, president of Magnetic Media Information Services in Honolulu. He estimated that the current installed base of CD-ROM drives in the U.S. is less than 12 million but will be about 60 million by 1998.

"Eventually, CD-ROMs will push floppy disk distribution out, but it's going to take a while yet," Lueck predicts.

Briefs

Exec departs IBM unit

Thomas Greaves, former head of marketing and development of PC products at IBM's EduQuest Division, has been named president and chief executive officer at DSP Solutions, a maker of audio devices for PCs.

Guide to managing assets

The Personal Computer Assets Management Institute in Rochester, N.Y., recently released "Comprehensive Guide to Personal Computer Assets Management," which describes strategies for managing desktop computer hardware and software assets. Topics include corporate PC life cycle, how corporate culture helps and hinders PC assets management and in-house vs. outsourced assets management. The guide costs $595. Call (800) 722-6487 for more information.

Oracle tools for the Mac

Apple Computer, Inc. Macintosh users can now build software with Oracle Corp.'s Cooperative Development Environment (CDE) tools. Oracle said it added Macintosh support for CDE, which already supported Windows and Unix.

IBM PC Co. does wireless

Squeaking by its first-quarter deadline, IBM PC Co. recently began shipping a wireless communications module and television tuner module for its ThinkPad 750C. The TV tuner costs $899, and the wireless module costs $1,999.

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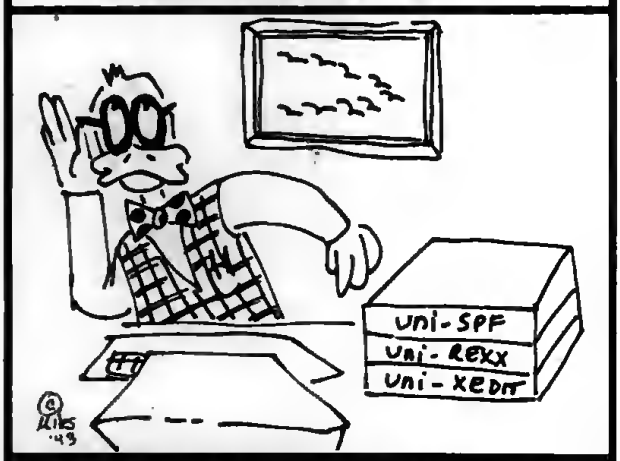

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Looking Glass Software, Inc. has introduced ViperWrite 2.0, a Windows-based hypermedia word processor.

According to the Inglewood, Calif., company, the product combines standard word processing tools with advanced hyperlinking and navigation techniques to generate multimedia applications.

Users can launch any Windows program and play video and animation clips directly from the presentation.

A HyperLayers feature defines each layer as a storage place for different display templates that developers can customize.

ViperWrite 2.0 costs $199.

▶ *Looking Glass Software*
(310) 348-8240

Iambic Software has announced Iambic TimeReporter, an Apple Computer, Inc. Newton MessagePad business application designed for users who need to track their time.

According to the Sunnyvale, Calif., vendor, TimeReporter works with Newton Intelligence to record and report times and expenses for billing purposes.

The product provides access to menu lists of clients, activities, projects and codes and several intuitive options for entering and viewing data.

Viewing formats include an overview of all entries, as well as the percentage of time and number of hours allotted to individual clients and activities.

Data can be instantly resummoned by code number, first word or lists of current clients.

TimeReporter costs $129.

▶ *Iambic Software*
(408) 746-3709

Verbex Voice Systems, Inc. has introduced Listen for Windows 1.2, a software-only continuous speech recognition system.

According to the Edison, N.J., company, the product recognizes sentences and phrases spoken rapidly or slowly without pauses between words.

Users can skip through Windows layers with a single spoken phrase, start a program by saying its name and enter data in a spreadsheet.

A number of speech interfaces are bundled with the product, including Lotus Development Corp.'s Lotus SmartSuite 2.0 and 2.1, WordPerfect Corp.'s WordPerfect 5.2 and Microsoft Corp.'s Microsoft Office Suite 3.0.

The system runs on any 486 66-MHz system or faster, 486 33-MHz with overdrive processor or Pentium-based PC equipped with sound cards.

Listen for Windows 1.2 costs $99.

▶ *Verbex Voice Systems*
(908) 225-5225

CFM, Inc. has introduced Version 3.1 of TeamFlow, flow-chart software designed for creating and modifying deployment flow charts.

According to the Bedford, Mass., company, deployment flow charts are used for total quality management, business process redesign and other process mapping applications.

TeamFlow offers Macintosh and Windows users the following: a team database architecture that integrates flowchart symbols with team data, providing automatic work sheet layout and flowchart routing capabilities, and support for advanced printing capabilities.

It also has a "team view" work sheet feature with four data fields that help users draw process flow diagrams using a team field, process field, time field and standards field.

TeamFlow 3.1 is available for an introductory price of $295 until Sept. 30.

▶ *CFM*
(617) 275-5258

Aquiline, Inc. has announced Hurricane, a notebook computer.

According to the Troy, N.Y., company, Hurricane offers an internal 5¼-in. CD-ROM drive; a sound chip on the motherboard; a 540M-byte integrated drive electronics removable hard drive; 20M bytes of RAM; and an Intel Corp. 1486DX2/SL 66-MHz static CPU.

Other features include a Type 2 PCMCIA card slot; a built-in trackball; I/O ports (serial, parallel and VGA); an AT bus I/O port for a docking station; and an 83-key keyboard.

Prices range from $2,840 to $5,940.

▶ *Aquiline*
(518) 272-0421

Umax Technologies, Inc. has introduced PowerLook, a 30-bit flatbed color scanner.

According to the Fremont, Calif., company, PowerLook's key features include a proprietary bus caching design and a 2M-byte output buffer; internal and external 10 bits per red, green and blue pixel; and an average dynamic range of 3.0 that lets users detect subtle differences in color levels across the range from light to dark.

It also has optical resolution of 600 by 1,200 dot/in. with a maximum of 2,400 by 2,400 dot/in.

The scanner meets ISO 9000 quality specifications. It is priced at $3,495.

▶ *Umax Technologies*
(510) 651-8883

Product shorts

Data Entry Systems has introduced MiniWriter, a handheld computer. MiniWriter generates data in paper and digital form. It also offers a large LCD readout and upgraded utility software programs. Cost: $1,335. Data Entry Systems, San Mateo, Calif. (415) 342-0893. . . . **The Jurisoft Division of Mead Data Central** has introduced LegalViews, an infobase technology package designed to help legal professionals manage, personalize and share large quantities of information. The product includes prebuilt infobase models that show users how infobase technology can streamline workflow. Cost: $495 for a single-user copy. The Jurisoft Division, Cambridge, Mass. (617) 864-6151.

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Distributed computing

Tivoli licenses its framework to IBM

By Jean S. Bozman

IBM has licensed object framework technology from Tivoli Systems, Inc. that will help IBM build its own "framework" for object-oriented distributed computing.

IBM's fee for the licensed technology was not disclosed, but IBM managers in Austin, Texas, and Raleigh, N.C., said IBM will be free to use Tivoli's object-based services for scheduling, tracking, object collection, security and user-defined policy

The services will be used for a distributed object management framework built on top of IBM's Distributed System Object Model (DSOM) technology, as well as to add object extensions to operating systems such as AIX, IBM said. The framework may not be available for two years, analysts said.

IBM's framework

David Bender, a senior manager of systems software at Charles Schwab & Co. in San Francisco, a Tivoli site, said he believes IBM may be building a superset of the Tivoli framework that unifies network and systems management.

"They're going to roll out a big-scale distributed computing environment running on top of [IBM] RS/6000s. And the [limiting] factor is not really the distributed technology per se, but it's the management of the technology," Beoder said.

Object Oriented Systems

Tivoli's technology will be used in place of the Open Software Foundation's Distributed Management Environment (DME)'s object framework, which never shipped because of architectural problems. IBM once considered acting as the systems integrator for the OSF's DME but later reversed that decision, OSF spokesmen said.

IBM's announcement with Tivoli came on the heels of the OSF's reorganization last month [CW, March 28] but is not directly related to the gradual shutdown of the OSF's technology development role, industry analysts said.

"This is not something that comes of the demise of OSF's old business model," said Scott Winkler, a program director at Gartner Group, Inc.'s Software Management Strategies Group. "DME fell apart last year, and if IBM liked some of the [Tivoli] technology they saw, they were able to go directly to the source and get a license."

Network integration

Tivoli's Common Object Request Broker Architecture (CORBA) 1.1-compliant code will be integrated with IBM's System Object Model (SOM) and DSOM technology to work with both IBM and non-IBM systems, IBM said. It will also be upgraded to support CORBA 2.0, which supports interoperability in mixed-vendor networks. Standards organization X/Open Co. has already agreed to include the Tivoli technology in upcoming open systems specifications for system management software.

"This will enable you to span processes across the network," explained Jamie Rhodes, product manager for object management services at IBM's Personal Software Products division in Austin, Texas.

"We've failed if it doesn't work with other vendors' platforms. The whole idea of open systems standards is that everyone implements the same plumbing so we can all inter-

Tivoli, *page 52*

IBM misses SMP deadline

Users wait impatiently; some switch vendors

By Stephen P. Klett Jr. and Jaikumar Vijayan

■ Users antsy to see symmetrical multiprocessing-capable servers from IBM still have a while to wait. The company has missed its self-imposed deadline to ship PC-based SMP machines by the end of the first quarter, and analysts estimate that the earliest they will appear is June.

While IBM irons out technical issues, a revamp of the server unit and strategy is also expected to delay delivery farther.

Meanwhile, observers said Novell, Inc.'s recent announcement that a symmetrical multiprocessing (SMP) version of NetWare will ship by year's end [CW, March 28] and IBM's own forthcoming OS/2 SMP are putting pressure on IBM to speed up its SMP efforts.

No time to wait

Users said they like the fact that IBM is acknowledging it has major server problems and is putting resources in place to solve them. However, some said they cannot afford to wait for the company to "get its act together."

"IBM's lack of SMP capabilities is a big concern for us, and their [tardiness] may force us to go with another vendor such as [Hewlett-Packard Co.] by default," said Bill Conley, manager of corporate information systems at Loral Aerospace in Newport Beach, Calif.

IBM actually was expected to release refreshed PS/2 Model 195 and 295 machines with features such as dual- and quad-Pentium processors, SMP support and increased availability and management features last fall. Sources at both IBM and Parallan Computer, Inc., which designs IBM's high-end servers, said "bugs" encountered in testing the machines' SMP capabilities pushed the release date of these servers back to the first quarter of this year [CW, Sept. 20, 1993].

IBM PC Co. recently reorganized its server efforts under a separate business unit, which is headed by general manager Michael Coleman. He said he is currently re-evaluating the entire server line and overall strategy [CW, Feb. 21].

Hit list

Broadening the company's server support beyond OS/2, "exploiting the Micro Channel Architecture and developing industry-standard hooks into NetView types of management environments" top IBM's server list, according to Michael Coleman, general manager of IBM PC Co.'s Server unit.

Coleman did acknowledge that the company's high-end strategy is less than ideal. "The 295 is clearly not where it needs to be — there is a need for a better-orchestrated Intel solution from IBM, which is my focus," he said, although he declined to say when the machines would be available

Strategy revamp needed

Randy Giusto, an analyst at BIS Strategic Decisions in Norwell, Mass., added it was "high time IBM re-established its server strategy" because its lineup is outperformed and overpriced at every level. Other analysts agreed that the restructuring was a good move but said it would also result in further delays in delivery of the refreshed 195/295 machines.

While the PC Co. said the reorganization would have no impact on the company's relationship with Parallan, analysts disagreed. For example, the server unit will now conduct engineering in-house, leaving Parallan with little role to play in any future development, the analysts said.

Either way, analysts said IBM has failed to fully leverage its alliance with Parallan. While IBM continues to market Parallan-developed high-end servers, the effort has been less than enthusiastic, said Lynn Berg, an analyst at Gartner Group, Inc. in Stamford, Conn.

"Parallan has four-processor and six-processor systems in its labs that IBM has simply shown no interest in," Berg said. She attributed the lack of interest to IBM's not wanting these systems encroaching on its midrange AIX-based RS/6000 and proprietary AS/400 product lines.

IBM, however, contends that it is waiting for SMP operating systems to become available before it announces its product.

"It's great to get into technology for the sake of technology, but in the case of symmetric multiprocessing, where are the apps to support it?" Coleman asked.

Keyfile unveils Notes imaging software

By Ellis Booker

Tipping its hat to the market hegemony of Lotus Development Corp.'s Notes, Keyfile Corp. in Nashua, N.H., announced last week a version of its document imaging software that is tightly integrated with Notes.

Analysts said the Keyfile announcement will be the first in a wave of imaging products for Notes. These products are expected to provide significant competition for a Notes companion program called Lotus Notes: Document Imaging. Better known as LNDI, it was built by Eastman Kodak Co. unit Imagery, Inc.

Scott McCready, director of imaging and workflow at International Data Corp. in Framingham, Mass., estimated that close to 15% of Notes sites have LNDI as well.

Document sharing

Keyfile's KeyConnect for Notes is said to offer several levels of integration. Users can share documents and other objects: Notes users can access Keyfile objects — documents, folders and workflows — from within a Notes application, and Keyfile users can receive Notes messages, documents and other objects within the Keyfile desktop. In addition, KeyConnect for Notes optionally supports Lotus' Vendor-Independent Messaging.

The Notes feature is available for Keyfile Version 2.3 at a cost of $995 per user.

KeyConnect for Notes, along with Keyfile's front-end product for IBM's recently announced client/server VisualInfo document image product, will be shown next week at the Association for Information and Image Management show in New York.

Tivoli framework

CONTINUED FROM PAGE 51

operate." He did not say when IBM's framework would ship, however.

Users with mixed-vendor networks agreed that IBM's object framework must support other vendors' platforms to be really useful. "I think that SOM and then DSOM are going to be important," said Chip Steinmetz, head of CS First Boston's Fixed Income Technology Group in New York. "But what I really want is for them to run on both IBM platforms and non-IBM platforms."

CS First Boston has a Unix network of 1,000 Sun Microsystems, Inc. workstations and servers and IBM-compatible mainframes. It has tested IBM's new PowerPC workstations as Unix clients, Steinmetz said, but has not installed them because of concerns about managing a mixed-vendor network.

"If you had a tool on top of everything that made the fact [that] it was a heterogeneous environment transparent, then it would be less expensive to administer," he said.

Industry analysts said an integrated approach to systems and management will be critical to the success of distributed computing applications. "I think it's pretty important to have a framework," said Chris Mortenson, a managing director at Alex. Brown & Sons, Inc. in New York. "My sense is the marketplace is looking for an environmental solution rather than a collection of individual tools."

Winkler said he expects that object-oriented environments for commercial computing are at least two to three years away.

The intersection of network and systems management consoles will be key to streamlining the administration of distributed networks, said Tivoli Chief Executive Officer Frank Moss. "If a [network] link goes down, it might cause a storm of alerts that arrive on both the network and system management side."

Tivoli's CEO Frank Moss: *Avoiding 'storm of alerts'*

Common alerts

But it is hard for users to know whether a database or a network link has failed, Moss said. "What we're doing with IBM is making sure that alerts from NetView and TME [Tivoli Management Environment] can be brought into a common console [so that users can] effectively isolate the problem and automate action."

Judith Hurwitz, president of Hurwitz Consulting Group in Watertown, Mass., said the TME 1.0 product is not scalable enough to support thousands of users. However, TME 2.0, which is set to be announced later this month, will address support for more than 1,000 users on enterprise networks, according to Tivoli.

Briefs

Standards to consider

The IEEE 802.11 committee approved for standards consideration a high-speed physical layer proposal for frequency-hopping spread-spectrum wireless LANs submitted by Proxim, Inc. The move follows the adoption of a proposed wireless media-access control standard from Xircom, Inc. last November and puts a draft standard on track for completion by the end of the year.

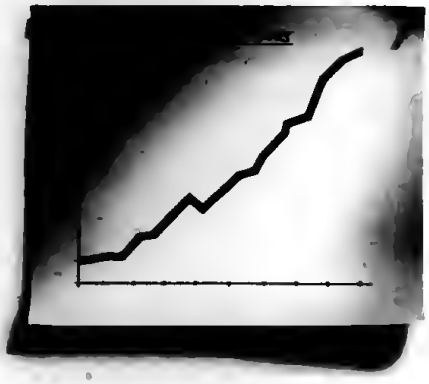
A book of IS advice

DOS-Unix Networking and Internetworking by Michael J. Burgard and Kenneth D. Phillips was written to provide information and hands-on implementation advice to information systems directors and network managers who are linking DOS, Windows and Unix PCs over LANs and internetworks. It also takes up X Window System terminals and network management software and evaluates about 100 different hardware and software products. The book is published by Wiley Professional Computing and costs $34.95. Call (406) 586-1673 to order.

Cray adds software

Cray Research, Inc. announced batch-processing and load-balancing software that can be used to regulate a work load of networked Unix systems. A new version of Cray's Network Queueing Environment (NQE), NQE 1.1, will assign tasks to whatever Unix computer on the network is available to handle the work load, Cray said. Among the Unix computers supported are those from Sun Microsystems, Inc., IBM, Hewlett-Packard Co. and Digital Equipment Corp. NQE 1.1, which was recently demonstrated at UniForum in San Francisco, will be available in the third quarter at a list price of $2,875 for a 10-user network license.

Your Boss's Expectations



The executive committee has decided that your company's key to sustainable competitive advantage is a flexible information system — one that can speed up your processes and let you react quickly to change. Unfortunately, they've also decided to cut your budget.

Most likely, this leaves you with a mainframe system that can't fill the bill and an accounting department that won't take kindly to larger monthly bills.

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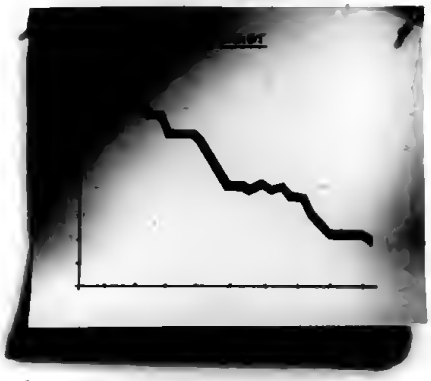
Your Budget



Of course, most members of today's executive committees have read an article or attended a seminar touting the wonders of economical mainframe alternatives and flexible client/server databases. So the answer probably seems simple — to them. But you've got to make it all work in the real world.

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Tricord announces entry-level server

By Jaikumar Vijayan

Tricord Systems, Inc. last week unveiled a scaled-down, low-cost addition to its PowerFrame family of high-end superservers.

Pricing for the new ES3000 server starts at $31,900. It is positioned as an entry-level alternative to Tricord's high-end ES400 and ES500 PowerFrame lines. The server, which can support 50 to 250 users, offers scalability to four CPUs — either Intel Corp.'s Pentium or 1486/66-MHz microprocessors — up to 16 byte of memory and up to 162G bytes of SCSI-compatible disk storage.

An ES3000 version using Peripheral Component Interconnect as a local bus running over an Extended Industry Standard Architecture bus is expected by year's end, said Mark Garver, vice president of corporate strategy and marketing.

"It is a very aggressive price for a system with its features," said Jennifer Munson, an analyst at WorkGroup Technologies, Inc. in Hampton, N.H. Tricord's announcement, according to Munson, is an attempt to price-position itself more competitively in a market challenged by low-cost PC servers from companies such as Compaq Computer Corp., AST Research, Inc. and Dell Computer Corp.

The launch follows the Plymouth, Minn.-based company's announcement last week of its technical alliance with Novell in the development of NetWare multiprocessing technology. According to Garver, the PowerFrame ES3000 is being targeted as a server platform for smaller networks using symmetrical multiprocessing-enabled operating systems.

Vendors unveil stackable switches

By Stephen P. Klett Jr.

Following the lead of hub vendors striving to pack more connectivity into smaller footprints at lower prices; Kalpana, Inc. and newcomer Matrox Electronic Systems Ltd. have developed stackable Ethernet switches.

Sunnyvale, Calif.-based Kalpana — one of the first companies to offer Ethernet switching — recently unveiled a 15-port stackable version of its stand-alone EtherSwitch designed to increase the throughput of departmental and workgroup 10Base-T networks.

In addition to supporting existing 10M bit/sec. networks, the switch will support full-duplex Ethernet, which doubles Ethernet's bandwidth by providing simultaneous two-way data transmissions between nodes.

Matrox Network Products Group, a division of Matrox Electronic Systems in Quebec, said it will unveil this fall its first switching product, a 16-port stackable switch on a PC board. The switch will allow any standard PC with an AT bus to be configured as an Ethernet switch.

Matrox will also offer a PC chassis that can house up to 16 switches for a total of 256 ports. Each port will be switched over an internal 320M bit/sec. bus, and each board will connect via a 1.28G bit/sec. backplane. Like the Kalpana switch, it will support full-duplex data transmission.

The switch bandwagon

Observers said the Kalpana and Matrox switches are a sign that the industry — both users and vendors — is becoming more comfortable with "stackables" and switching technology and that combining the two is a logical move. However, while they said this trend would make switches more of a commodity like their hub counterparts, they also said support for alternatives to emerging high-speed networking technology would be a key differentiator.

For example, full-duplex Ethernet will enable users to delay investing in the staff time, new analyzers and network management needed with higher bandwidth technologies such as 100M bit/sec. Ethernet and Asynchronous Transfer Mode, said Michael Howard, president of Infonetics Research, Inc. in San Jose, Calif.

In addition to full-duplex, Kalpana's stackable EtherSwitch will provide the following capabilities:

- **Address filtering**: Allows network managers to restrict specific nodes on the network from communicating with other nodes on a port-by-port basis.
- **Virtual EtherSwitch**: Lets one switch be partitioned into multiple virtual LANs or domains, with each domain acting as a stand-alone switch. Each domain can be treated as a separate subnet.
- **SNMP support**: Each switch will have an embedded Simple Network Management Protocol (SNMP) agent with Management Information Base (MIB) II support to ensure manageability via third-party applications such as Hewlett-Packard Co.'s HP OpenView.

The EtherSwitch is available now starting at $500/port. The Matrox switch, which will offer SNMP and MIB II support as options, will be available by the end of the year starting at an estimated $250/port.

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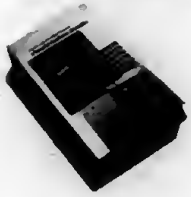

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Health reform raises privacy issues

Bill would standardize rules, access for health care professionals' use of electronic patient records

By Mitch Betts
WASHINGTON

■ Electronic medical records traveling from coast to coast could encounter a number of different state privacy laws, some strong and many weak. So a key member of Congress has introduced a bill that is likely to become the first federal law providing uniform privacy rules for patient data.

U.S. Rep. Gary A. Condit (D-Calif.), whose subcommittee has jurisdiction over the matter, said his proposed Fair Health Information Practices Act will be grafted onto whatever health care reform legislation emerges from Congress.

U.S. Rep. *Gary A. Condit says his bill will be grafted to health care reform legislation*

Although chief information officers in the health care industry generally oppose government regulation of their affairs, they make an exception when it comes to uniform privacy rules and electronic data interchange standards [CW, Sept. 20, 1993].

Uniformity is a must

Ed Heller, a former hospital CIO and now president of the Computer-based Patient Records Institute in Chicago, said nationwide uniformity is vital because electronic medical records should be able to follow patients wherever they move.

"When you transfer information from state to state," Heller noted, "the only way that's legally workable is if everybody agrees to the same rules for confidentiality."

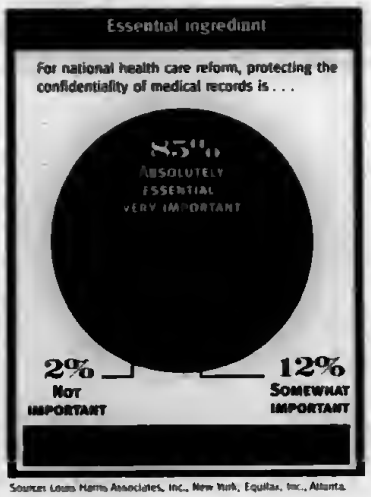
The legislation is strongly supported by the American Civil Liberties Union (ACLU) because it provides comprehensive privacy rules that will be "up and running on the date of enactment" of health care reform, said Janlori Goldman, director of the ACLU's Privacy and Technology Project.

Goldman and other privacy advocates were upset because the Clinton proposal does not call for a comprehensive privacy policy until two years after enactment [CW, Nov. 22, 1993].

Privacy protected

Condit's bill, which blends proposals from the Workgroup on Electronic Data Interchange and the American Health Information Management Association, has the following features:

- A hospital, insurer or any other organization with access to patient data becomes a "health information trustee," which must protect the patient data with the appropriate security controls (including audit trails) and restrict disclosures.
- Disclosures are permissible only for patient treatment and payment, emergency care and reports to public health and law enforcement authorities. For example, patient data could not be sold as a mailing list for targeted marketing campaigns unless the patient consents. Furthermore, disclosures must be limited to the smallest amount of data needed for the purpose.
- Patient data obtained for one purpose cannot be used for another purpose. For example, that would prevent employers from using insurance claims data to make employee assignments or promotions.
- Privacy requirements continue even if patient data is transferred to third parties or used by contractors. Violators would be subject to criminal penalties of up to 10 years in prison, as well as civil lawsuits.
- Patients have the right to get a copy of their medical records and seek corrections.



Sources: Louis Harris Associates, Inc., New York; Equifax, Inc., Atlanta.

Better security

A new survey by the Chicago computer law firm Gordon & Glickson suggests that some hospitals would need to beef up their security policies to comply with the Condit bill. The poll of 260 hospitals found that 28% do not have a written policy on patient information, and only 43% have audit trails to track access to sensitive information.

Condit's bill preempts state privacy laws to achieve nationwide uniformity for electronic data interchange, but Condit said that language may need some fine-tuning. Some state privacy laws such as those that provide strong protection for data related to acquired immune deficiency syndrome (AIDS) patients may not need to be preempted.

Xyplex announces ISDN hub modules

Further proof of ISDN's taking off, analysts say

By Stephen P. Klett Jr.

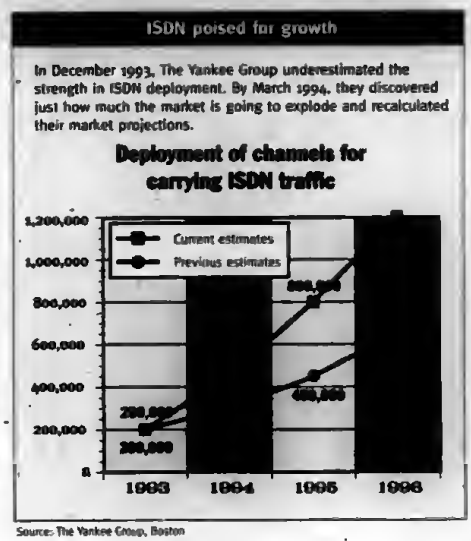
Corporate sites looking to connect remote users via switched digital networks received another shot in the arm last week from Xyplex, Inc. in Littleton, Mass. The company has unveiled Integrated Services Digital Network (ISDN) modules for its Network 9000 hub family.

Benefits

The modules were jointly developed with Primary Rate, Inc. in Salem, N.H., and support Basic Rate and Primary Rate ISDN services in addition to Switched 56 and fractional T1/E1. By integrating ISDN services into their hubs, Xyplex said users can boost network reliability, simplify management, cut operational costs and achieve more flexibility in implementing bandwidth-on-demand applications. These applications include activity-based routing, bandwidth aggregation, leased-line backup and time-of-day routing, which allows users to schedule routing for specified time periods.

Xyplex's single-slot modules are hot-swappable, meaning that a failed module can be pulled out and replaced without turning the box off. The modules consist of an ISDN interface module that is mated with a bridge/router processor module. Each integrated module contains an embedded data service unit (DSU) and optional channel service unit (CSU).

This provides network management capabilities and helps cut costs by eliminating the need for external multiplexers and DSU/CSUs, Xyplex said.



Source: The Yankee Group, Boston

For beta site Vertex Pharmaceuticals, Inc. in Cambridge, Mass., the modules' prime benefit is the ability to consolidate remote-access capabilities, according to Brian Perry, director of information services. "The main technical advantage of this technology is the ability to manage everything in one place," Perry said. He estimated that the modules will cut in half the roughly five hours a week his department spends managing users' remote access to data.

Meets remote needs

Vertex will use the module to integrate external asynchronous ASCII and AppleTalk dial-up services into a single 9000 hub, providing remote Macintosh and Unix users with the ability to access corporate data from home. Vertex has been trying to set up a similar capability over standard phone lines, "but they were just too slow.

Xyplex, *page 60*

Is this ad a pack of lies?

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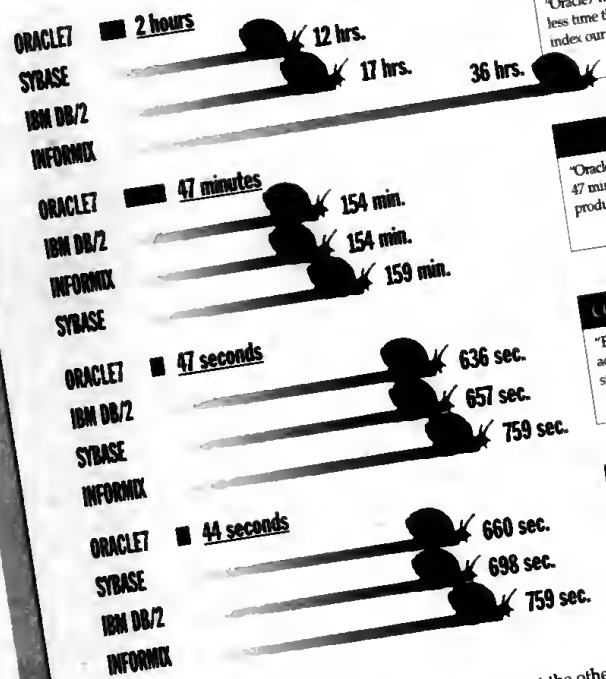
PC Magazine independently defined and ran a battery of real world performance tests to compare database server software. PC Magazine states, **"Oracle7 was the hands down winner on our performance tests, outperforming the others by a wide margin."**



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Just to be fair, here's what PC Magazine had to say about the other guys:

Informix OnLine *"Only after days and days of repeated crashes were we able to obtain a full set of results."*

Ingres Server *"...we would not recommend it because of the showstopping multi-user bug we encountered."*

Gupta SQLBase *"...took an unthinkable 60 hours to load the tables and then crashed on the index builds..."*

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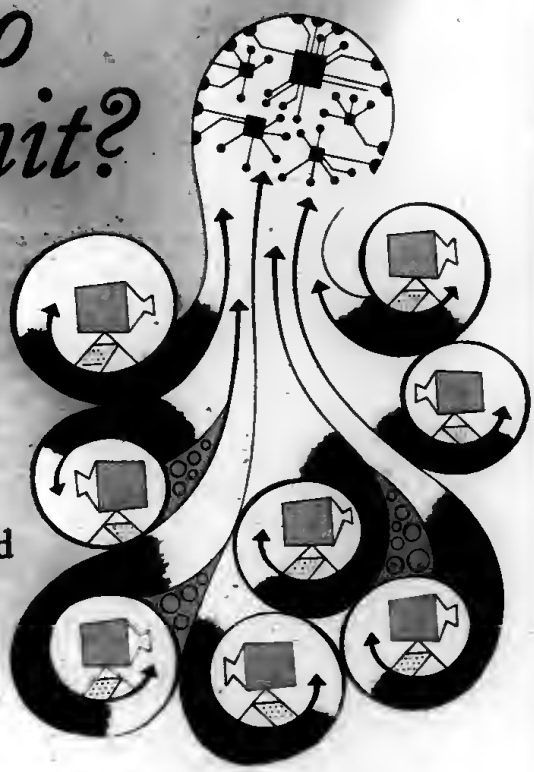

by Brian Butler and Sheryl Canter

Client/server SQL (Structured Query Language) databases have been available on Intel-based systems for years. Yet only now is interest in them exploding. Why?

The low costs of CPU power, hard disk storage, and memory make the move to PC-based servers all but inevitable. At last, it pays to displace mini- and mainframe computers from their traditional turf: large, mission-critical databases. New 32-bit operating systems such as Microsoft Windows NT, NetWare, and OS/2 also offer safety, performance, and

IN THIS REVIEW

Gupta SQLBase Server for NetWare
IBM DB2/2
Informix OnLine for NetWare
Ingres Server for OS/2
Oracle7 for NetWare
Sybase SQL Server for NetWare
Watcom SQL, Network Server Edition

Illustration by Philip Anderson

comparative ease of use on the PC server platform. Even the new, handsome graphical tools at the client end make SQL queries less of a chore. Still, the big question remains: Is PC-based SQL robust enough to bank your business on?

To find out, we torture-tested seven SQL database servers using a 1-gigabyte, four-table database with a million rows per table—a database some ten times as large as the one we used in last year's SQL roundup (for more information, see "SQL Databases: High-Powered, High Priced," September 15, 1992).

What we found was that most of the seven reviewed products choked on our tests to some extent. Only Oracle7 for NetWare and Sybase SQL Server for NetWare, Version 4.2, survived without need of a midcourse patch. Gupta SQLBase Server for NetWare, Version 5.12—which the company claims is meant to handle smaller databases—took an unthinkable 60 hours to load the tables, and then crashed on the index builds; the company subsequently withdrew the product from the performance test portion of the review. Ingres Server for OS/2, Version 6.4, could not complete the multiuser portion of the test, because of a bug that caused clients to drop from the server. Locking problems with Informix OnLine for NetWare, Version 4.1, caused the server to crash repeatedly—sometimes with data loss forcing us to restore from tape.

It is important to note that performance testing can bring out problems that might not surface in a normal production environment. Ultimately, after some tuning and tweaking, all of the products except for SQLBase and Ingres Server managed to complete the full test suite.

Our conclusion? Stable, industrial-strength SQL on the PC is a reality—though at times an elusive one. Only a careful product selection saves you from installation nightmares, unstable operation, or undue limitations on your growth and migration path.

PC MAGAZINE ▶ EDITORS' CHOICE

• **Oracle7 for NetWare**

Client/server SQL databases are among the most complex products available for the PC. The best products have powerful engines that can access data quickly, ensure referential integrity, enforce business rules, communicate with servers on other platforms, and launch nondatabase applications. Most importantly, these sophisticated features must be implemented flawlessly; SQL databases must be stable and absolutely reliable.

Oracle7 for NetWare meets all these requirements. Completing our performance tests in just three days and without a single hitch, Oracle7 was also one of the best-performing products we test-

PRODUCTS FOR ALL PLATFORMS

This year marks the first time that all the reviewed SQL databases are 32-bit implementations, and platforms for reviewed products span DOS, NetWare, and OS/2—the predominant Intel-based platforms. With a couple of notable exceptions, all of

HIGHLIGHTS

Client/Server Databases

PC-BASED SQL databases are now robust enough to handle your mission-critical, enterprise-wide data—but choose carefully. Performance, stability, maximum database size, installation, and administration issues should be on your list of things to check as you investigate the offerings from each vendor.

32-BIT is the big news this year with all seven reviewed products now boasting a 32-bit architecture. One result: For the first time, OS/2 databases can keep up with NetWare Loadable Modules. There are now 32-bit SQL databases for all the popular Intel-platform operating systems: DOS, OS/2, Windows, and soon Windows NT.

PRICE AND PERFORMANCE are also important considerations. Prices for these products vary widely, from downright cheap to prohibitively expensive. But, performance-wise, you get what you pay for. While a small department may do well with a slow-but-stable engine, a large enterprise should look for speed and capacity found only at the top of the line.

OUR TORTURE TESTS brought five of the seven reviewed products to their knees to one extent or another, showing that stability is still a concern under some operating circumstances. Only Oracle7 and Sybase SQL Server made it through the test suite without midcourse tweaking or patches.

ORACLE7 was the hands-down winner on our performance tests, outperforming the others by a wide margin. In fact, it finished the entire test suite in less time than most took just to load and index our data. Sybase SQL Server proved an admirable second-best.

BUT WHAT GOOD is a powerful back end if users can't intuitively access the data? In our issue of November 9, we'll look at the GUI development tools used to create SQL database apps.

ed; only Sybase SQL Server for NetWare, Version 4.2, posed a serious challenge. In addition, Oracle7 offers the full gamut of features, including triggers, stored procedures, cost-based optimization, group-level security, declarative referential integrity, and event alerters. Distributed database support is also strong, with two-phase commit and a cost-based distributed optimizer. Oracle7 also offers good cross-platform support. Oracle7's price is high, but you can't do better for enterprise-wide, mission-critical databases.

An honorable mention goes to Sybase SQL Server for NetWare. Though pricey for installations with 13 to 28 clients and not as strong as Oracle7 in terms of distributed database support, Sybase SQL Server is stable, feature-rich, and fast. And like Oracle7, Sybase SQL Server managed to get through our performance tests with nary a hitch.

Watcom SQL, Network Server Edition, a new entrant to the PC-based SQL database market, also deserves an honorable mention. Version 3.1 is not particularly fast, but it's solid as a rock—a slow but steady performer suitable for small to medium-size applications. Watcom SQL is also the cheapest option by far. In absolute dollars, it's about a tenth the price of the competition, and it is also the cheapest in terms of cost per transaction. With easy installation and few tunables, Watcom SQL is an especially good choice for those new to client/server databases.

Gupta SQLBase Server for NetWare (Version 5.12), Informix OnLine for NetWare (Version 4.1), and Ingres Server for OS/2 (Version 6.4) all boast rich feature sets but were not fully stable during performance testing. IBM DB2/2, Version 1, was very stable, but its IBM-shop orientation and the requirement that the entire database fit on one physical disk is too constricting for us to recommend it at present.

the major client/server back-end vendors are represented in this roundup: Gupta Corp., IBM Corp., Informix Software, Ingres Corp., Microsoft Corp., Oracle Corp., Sybase, and Watcom International Corp. Unfortunately, we were unable to review XDB Systems' 32-bit SQL database for OS/2, because the company could not spare the resources needed to participate. Novell has not updated its database server product, NetWare SQL, since we reviewed it last year, so we have not revisited it here. Also, Raima Corp. was slated to ship its new Raima Database Server product line (with versions available for Microsoft Windows NT, NetWare, and OS/2) in this year's third quarter, too late for inclusion in this roundup.

Though both Microsoft and Oracle currently have NT ports of their SQL databases (with Gupta, Informix, and Watcom following close behind), these were not to be released until NT itself was released (see the sidebar "SQL on NT: Exploiting the Strengths"). Version 3.1 of Watcom SQL, Network Server Edition, was the only DOS product we reviewed. It is available in three versions: 16-bit DOS, 32-bit DOS, and Windows. The DOS versions are available as standalone or network enabled; the Windows product is standalone only. We reviewed the 32-bit networked product for this story.

Gupta's SQLBase is available for DOS, OS/2, and NetWare; the company submitted the NLM version for review. NLMs (NetWare Loadable Modules) are generally much faster than DOS or OS/2 products, because they run at Ring 0, essentially becoming part of the operating system. One school of thought says that NLMs are potential time bombs because the operating system is not protected from the NLM; if the NLM crashes, the server will crash. We, however, did not find NLMs to be inherently less stable than OS/2 or DOS products.

THE MOST STABLE OF THE CLIENT/SERVER SQL DATABASES THAT WE TESTED WERE ORACLE7, SYBASE SQL SERVER, AND WATCOM SQL.

Last year, the 32-bit NetWare products were much faster than the OS/2 products, which were all still 16-bit OS/2 1.x applications. This year's all-32-bit lineup levels the playing field, showing that a well-written OS/2 SQL server can compete with an NLM. In informal testing, Microsoft SQL Server for NT, Version 4.2, and Oracle7 for NT also demonstrated that NT products can deliver competitive performance.

IBM released OS/2 2.1 during our testing of SQL databases, so we started off with OS/2 2.0 on the server and ended up with OS/2 2.1. We had endless problems with OS/2 2.0 because of incompatibilities with the Compaq machines used in our test-bed. An IBM service pack solved some of the problems but introduced others. These difficulties, however, all disappeared with OS/2 2.1. If you've had stability problems with OS/2 in the past, we recommend upgrading to the new version.

Performance testing was conducted at PC Magazine Labs with extensive vendor participation. We gave vendors a testing specification and provided the code to implement the spec. Vendor representatives then spent a minimum of two weeks with us in the lab while we performed the performance tests.

BIG MUSCLES, BIG CRASHES

Client/server SQL databases are built to handle the kinds of huge databases and multiuser loads that have been the tradi-

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Suitability to Task: Client/Server Databases

We speak of client/server SQL databases as a single category, but not every back end is suited to every type of application. Some back ends were designed to handle all your company's mission-critical data, while others are better for more mundane but still vital chores.

For **enterprise-wide applications,** a SQL database must have a large capacity, support distributed databases and multiple networking protocols, and be able to connect to minis and mainframes through gateways or the ORDA. The best products include cost-based distributed optimizers and two-phase commit. Support for the TCP/IP networking protocol is important for connecting to Unix systems. Stored procedures, which improve speed and can be used to ensure enterprise-wide compliance with business policies, are also important here.

The requirements for smaller **departmental applications** are very different from those for enterprise-wide apps. Here, the general accessibility of the product overrides considerations of performance and capacity. In judging suitability in this category, we look for a low price, general ease of installation and use, few tunables, and high-quality documentation that includes tutorials and an overview of how the product's pieces work together.

In **decision-support applications,** the key factors are the ability to load data quickly, perform ad hoc queries, and generate reports. The best products also have broad front-end support and provide engine-level features such as forward- and backward-scrollable cursors to improve flexibility and response time.

SQL databases used for **mission-critical applications** must first and foremost be bug-free and stable. Once this minimal requirement is met, we look for fault tolerance, on-line backup, flexible restore options, engine-supported auditing, and good security features. Security provisions should include a large set of granular privileges and the ability to set security options by group as well as by individual user.

When SQL databases are used for **transaction processing,** they must have flexible isolation levels that let the database administrator optimize for concurrency versus consistency. The best products also have event alerters that signal critical database changes, use triggers to implement business rules, and have engine-enforced referential integrity either through triggers or SQL syntax. The ability to launch nondatabase applications when defined database events occur is also a plus here.

SUITABILITY TO TASK

Product Name

	POOR	FAIR	GOOD	EXCELLENT
Enterprise-wide apps	●	○	○	○
Departmental apps	●	●	○	○
Decision-support apps	●	●	●	○
Mission-critical apps	●	●	●	●
Transaction processing	●	●	●	●

tional province of mainframes, minicomputers, and multiprocessor Unix servers. File/server database management systems such as Microsoft FoxPro and Borland's Paradox, which bring the data over the network to the client for processing, are simply not efficient enough to handle tasks on this scale. Client/server technology lets the database front-end off-load SQL processing to the back-end server. Only the result sets travel back to the client, greatly reducing network traffic.

Since large client/server databases are generally the lifeblood of businesses that use them, SQL database servers provide a myriad of complex features to ensure database integrity and minimal downtime. Ironically, the very complexity of these features can make SQL databases vulnerable to showstopping bugs that crash the server. The most stable products we tested were Oracle7, Sybase SQL Server, and Watcom SQL (a new entrant into the SQL database market). The new IBM DB2/2, Version 1, was stable once we got it up and running, but hardware and software compatibility problems made this exercise far from trivial. Other products raised a variety of stability concerns.

Though any client/server database has a larger capacity than a file/server system does, the category is far from homogeneous. SQL databases vary greatly in both price and performance. Some products, such as Watcom SQL and DB2/2, are relatively inexpensive and easy to administer, but slow performers. Others, such as Oracle7 and Sybase SQL Server, are feature-packed, highly tunable, and blazingly fast—but cost top dollar. The choice of which product best suits your needs depends on whether you are using it for a departmental database—SQLBase's forté—or an enterprise-wide application. (For an analysis of the price/performance tradeoff, see the sidebar "Getting What You Pay For".)

SQL databases that are geared toward enterprise-wide applications also include support for distributed databases and cross-platform communication. Oracle7, Ingres Server, and Sybase SQL Server lead the pack in this area. Oracle7 and Ingres Server are the only products that support transparent two-phase commit needed for synchronization in a distributed environment. Sybase SQL Server offers an API (application programming interface) for programming it manually.

The next release of Sybase SQL Server—System 10—will place even greater emphasis on distributed processing, but in the form of replication rather than a distributed database model. Replication is a more loosely synchronized form of distributed processing. Instead of copying entire tables or databases, the scheme is transaction-based: Clients register with a replication server for only the information they'd like to receive. One big advantage is that the replication server can store the requested information and resend it later if the link with the client is temporarily broken. In a distributed database, if the client were offline, the transaction could not be completed. The looser synchronization of replication is adequate for most applications, but some will still require the tight coordination of distributed databases (see the sidebar "Distributed vs. Replicated Databases").

TOP SECURITY

For mission-critical databases, data integrity is paramount. SQL databases provide for this in a number of ways. All support what is called *transaction processing:* Changes to the database are not written to disk until a COMMIT command is issued. If you change your mind

Performance Tests: SQL Databases

CONTINUES

Just about every SQL database management system we looked at choked to some extent on our performance tests. Ingres Server for OS/2 failed to complete the multi-user tests, and Gupta withdrew its SQLBase Server for NetWare from the tests entirely. Oracle7 for NetWare was the standout performer across the board; Sybase SQL Server for NetWare performed admirably as well. Informix OnLine for NetWare's scores were respectable, while those of IBM DB2/2 and Watcom SQL were mixed.

How We Tested

To evaluate the SQL databases in this roundup, PC Magazine Labs chose a subset of tests from the AS3AP (ANSI SQL Standard Scalable and Portable) Benchmark Tests for Relational Database Systems, developed at Cornell University by Carolyn Turbyfill, Dina Bitton, and Cyril Orji. AS3AP is a cross-platform battery of benchmark tests covering a spectrum of typical database operations.

We used a 486/50 Compaq Systempro/XL as our database server, equipped with 64MB of RAM and 2.2GB of hard disk storage (eight Conner hard disks), two Madge Smart 16/4 EISA Ringnode Token-Ring cards, and a Compaq IDA-2 SCSI controller card. On the client side, we used 36 identically equipped 386SX/16-based Compaq Deskpro 386/N computers equipped with Proteon ProNET-4/16 P1390 Token-Ring cards. For the Ad Hoc Query and Mixed Workload tests, we used an additional Compaq Deskpro 486/33M client equipped with a Madge Straight Blue 16/4 Token-Ring card. We used an additional NetWare file server running on a Compaq Systempro 486/33 equipped with a Madge Smart 16/4 EISA Ringnode Token-Ring card for file services. This server held the data files, client software, and executables used for the performance tests.

We conducted all the tests on a NetWare 3.11 network running SPX/IPX over Token-Ring. Since IBM does not provide NetWare support for DB2/2, the company provided its own network drivers and NetBIOS version. Also, since IBM DB2/2's drivers cannot span a database over multiple hard disks, we had to change the IBM configuration to give the product more contiguous storage.

Our test database consisted of four tables, each comprised of 1 million rows. Each row was approximately 160 bytes long (the exact values varied by vendor). Test data for each table was supplied in the form of an ASCII comma-delimited file. The value types in the database columns included integer, floating-point, and date, as well as fixed-length and variable-length character strings.

We are not presenting the results for Gupta SQLBase Server for NetWare; its Load and Index time was so slow that the company had to withdraw from our performance tests in the early stages for lack of available lab time. Later, PC Labs invited Gupta back, providing ample time to perform the data load. SQLBase successfully completed loading after 60 hours—almost twice as long as it took the next-slowest competitor. SQLBase then consistently crashed each time we tried to create the indexes required to perform the test, sometimes destroying the database in the process. The company then withdrew from testing entirely.

Ingres Server for OS/2 was unable to complete the multi-user tests (Random Read, Random Write, and Mixed Workload) because of a bug in the DOS client software, causing clients to drop the server connection spontaneously. It completed the remaining tests successfully.

LOAD AND INDEX

The Load and Index test measures how quickly the database system can import our 4-million-row tables and create 12 standard indexes and 4 clustered primary indexes. Vendors that did not support clustered indexing used straight B-tree indexes. Only three vendors support clustered indexes: Informix, Ingres, and Sybase.

Most vendors supported a method for loading the data from the server, thus eliminating network bottlenecks and optimizing load rates. The only exceptions were the products from Gupta and Informix. For these two, the import files were placed on a separate NetWare file server. The 486/33 client was then used to read the files and import them into the database server across the LAN. Since network latency and throughput are a bottleneck in this scenario, neither one of these products performed well relative to the competition. Both required a custom C application to import the data.

LOAD AND INDEX

Oracle7 for NetWare was the top performer overall, using its NLM-based SQL*Loader utility to load the tables. SQL*Loader loads data in a variety of formats, performs filtering (selectively loading records based on data values), and can load multiple tables simultaneously. In fact, SQL*Loader is so complex and powerful that the manual devotes about a

CONTINUES

hundred pages to describing it. SQL*Loader also uses a data-loading language that is upward-compatible with IBM's DB2 Load Utility.

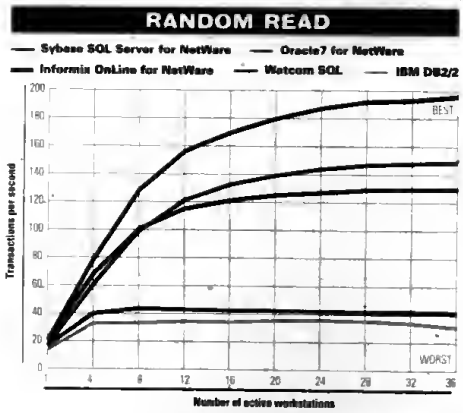
SQL*Loader's Direct Path option contributed to Oracle7's fast loading time. With this option, the ASCII files are directly formatted into database blocks (Oracle's term for database pages) and written directly to the database, bypassing most RDBMS processing. Oracle7's load time was only 13 percent faster than Sybase SQL Server for NetWare's, but it was three to four times as fast as the rest of the competition. Oracle7 created the standard indexes almost twice as quickly as the nearest contender, Watcom SQL, and almost nine times as fast as IBM DB2/2.

Surprisingly, Watcom SQL came in second overall; its table load time was fourth and its index time second. For performance reasons, Watcom decided to write a custom C application to load the data, instead of using its SQL extension. Watcom SQL's B-tree indexing helped keep the index time down but exacted a significant penalty on our Ad Hoc Query test.

Ingres Server's load, index, and combined times were all third-place. It imported the data by using the COPY command, an Ingres SQL extension. The COPY command proved very easy to use and let us batch the loading of the data. We first copied data onto the OS/2 server, and then a script executed the loading and indexing of all the tables. This convenient feature let us load the tables overnight. Other products needed processes with at least two steps for loading the tables, and also required user intervention.

Sybase SQL Server placed second in terms of its table load time but fourth overall and for indexing. Sybase now bundles an NLM version of its Bulk Copy Program (BCP), which greatly improved its table load performance. Sybase SQL Server supports clustered indexes and thus paid a penalty in index creation while netting a performance gain on the other tests. To create a clustered index, the database physically rearranges all the rows in key order. But if you remove the clustered index time from consideration, Sybase SQL Server slips from fourth to fifth place.

IBM DB2/2 placed fifth overall but came in last in terms of its load time. IBM does provide a utility to load comma-delimited files, but these files must be in a special format. We also used a third-party fast loader available for IBM DB2/2, which ultimately delivered scores that rank with the NLM-based loaders, but it took several tries before IBM could supply us with a working version of the program.



Finally, IBM wrote a custom C program to import our test data.

OnLine came in last overall; its table load time was second to last and its index score last. Since Informix Software provided no utility to load comma-delimited files, the company wrote a custom C application to do the job. Informix couldn't write an NLM version of this load utility on such short notice, however, so the load had to take place from a client, over the LAN. This hurt OnLine's table load time. (The package did do well when creating standard indexes, however.) In creating the clustered indexes, its performance was poor. Informix will fix this problem with the next release.

RANDOM READ

The Random Read test shows the maximum number of concurrent retrievals the system can handle. For this test, each workstation randomly selects a single-row from the same table, which is then fetched across the network; results are then discarded at the client by directing the output to the device NULL. We did not display the results, since we did not want the terminal I/O to play a role in the measurements.

Records were read in the lowest lock level that the product would support, thus permitting the greatest amount of concurrency (we required that each vendor take at least a shared-level lock on the row or page level). Since the all locks are shared-level, no blocking occurs. Multiple clients can access the same row or page without concurrency loss.

We ran each client level for 10 minutes. Timings for the first 4 minutes are discarded, giving the system time to fill the cache and reach 2 steady state. We then took the next 5 minutes' worth of timings and discarded the last minute's timings. This method lets us guarantee accurate and consistent scores. The Random Read test lasts for 1 hour 40 minutes. Throughput is calculated in transactions per second (TPS).

Sybase SQL Server clearly outperformed the others on our Random Read test. This is partly due to its NLM architecture and clustered indexing. Oracle7 placed second but was bottlenecked by the hard disk subsystem. Since Oracle7 does not support clustered indexes, it was forced to perform at least one I/O per lookup. At 150 TPS, Oracle7's CPU utilization of the server was a mere 15

percent. Sybase SQL Server, on the other hand, obtained a peak throughput of 200 TPS with about 90 percent CPU utilization. We feel that with a faster hard disk subsystem, Oracle7 could have easily broken the 200-TPS mark.

We had numerous problems getting OnLine's control logic to work, but once past these hurdles it performed well. The server bugs we encountered affected simultaneous access to rows and lock time-outs, but we were eventually able to work around the problems. The tested version of OnLine is the first release on the NetWare platform; the company says the next maintenance release will fix these problems.

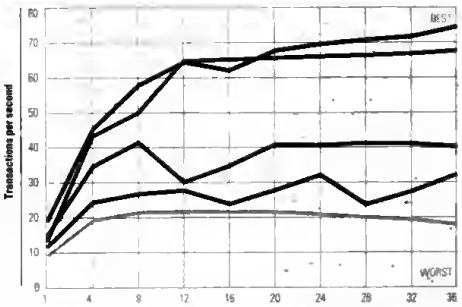
DB2/2 and Watcom SQL did not perform nearly as well as the others. Both products were at a disadvantage because they support only one network card at a time. Watcom SQL was not a top performer on any of our tests, so much of its performance can be ascribed to the inherit limitations of its engine. DB/2 did perform quite well on our other tests, however. One culprit might be IBM's use of NetBIOS, a very slow protocol. Another contributing factor may be the process architecture of DB2/2 itself, with its high context-switching overhead. Ingres Server was unable to perform our multiuser tests, because of the client software bug mentioned earlier.

RANDOM WRITE

The Random Write test shows the maximum number of concurrent updates the system can perform. For this test, each workstation randomly updates a single row from the same table. The test modifies the value of a nonindexed field so that only the row has to be updated. Indexes remain untouched. Rows are accessed in update mode, which permits data sharing in the table but does not allow anyone else to access the row (or page, depending on the lock granularity) currently being updated.

We ran this test in much the same way we ran the Random Read test, taking timings only during the middle 5 minutes of a 10-minute run at each client level after a steady cache state had been achieved. Again, the total time of the test was 1 hour 40 minutes. We calculate the throughput in server TPS.

RANDOM WRITE



The results of the Random Write test clearly demonstrate certain performance benefits of the 32-bit NLM platform. Sybase SQL Server outperformed Oracle7, but we must point out that Sybase's engineers had to change the attribute of one of the table columns from NULLable to NOT NULL. While this seems like a trivial detail, the change caused a three fold improvement in Sybase SQL Server's performance. At the original specification, Sybase produced 25 TPS; in the changed configuration it produced 75 TPS.

Oracle7 achieved a peak throughput of 67 TPS, taking only 10 percent longer to complete the task than Sybase SQL Server did. Oracle7's strong performance was due to record-level locking, as well as a new caching feature that allows the clients to share SQL context areas (called Shared SQL Pools).

Oracle7 once again showed unusually low CPU utilization, suggesting that it would respond dramatically to a faster hard disk subsystem. Oracle7's strong numbers were achieved without the use of special options. Oracle chose not to use its somewhat controversial Discrete Transaction feature or hashed indexes, both of which would have provided a performance gain.

OnLine finished third in total throughput, with a score of 41.44 TPS. This product uses record-level locking and was able to perform an update-in-place; it also uses a clustered index. Watcom SQL came in fourth in total throughput, with a TPS rating of 32.38, due in part to its use of record-level locking and multithreaded design. DB2/2 was last because it used the slower NetBIOS protocol and possibly because of context switching.

AD HOC QUERY

The Ad Hoc Query test predicts a product's effectiveness in a decision-support environment. The query mix is submitted from a single Compaq Systempro 486/33 client, and the elapsed time for each query is recorded. The ad hoc mix consists of 20 queries that stress four different aspects of the database server: selection, joins, projects, and aggregates.

The six selection queries measure the speed at which the database can selectively scan a table. The eight join queries show how well the optimizer can pick the fastest access path from the available indexes. The test includes two projection queries to evaluate each database's sort utility.

AD HOC QUERY

as most projections require a sort. The four aggregate queries show how well the products can calculate a variety of aggregates (minimum, maximum, average, and count).

Oracle7 completed the queries in a blistering 47 minutes, three times as fast as most of the other products. Ingres Server, DB2/2, OnLine, and Sybase SQL Server all completed the Ad Hoc Query test within 10 minutes of each other, with times around 2.5 hours: Watcom SQL trailed the pack, with a total elapsed time of over 19 hours. Interestingly, the OS/2 products held their own against the NetWare products, an indication of the power of this year's new 32-bit implementations.

The only tested products lacking read-ahead capabilities are Sybase SQL Server and Watcom SQL. Read-ahead greatly increases the speed at which the database can read data from the hard disk. Instead of reading a page at a time from the disk, the database can read groups of pages. The exact number is usually a tunable database parameter. Oracle7's speed is attributable to its read-ahead abilities, fast sorting, and new query optimizer.

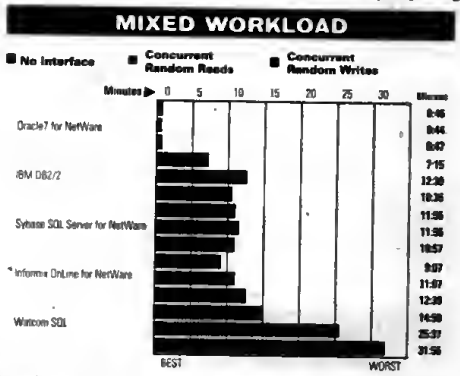
OnLine, on the other hand, has one of the least advanced optimizers—one that uses only limited statistics to determine the access path. In looking at OnLine's results closely, we found that a single query accounted from more than an hour of its total score.

This illustrates that an optimizer that chooses the wrong access path for a query can be an extremely expensive liability. Watcom has a rule-based optimizer with no read-ahead capabilities. Thus, if the optimizer made a mistake (which it often did), its slower I/O speed caused the query to run for hours.

MIXED WORKLOAD

The Mixed Workload tests show the effect of concurrency on a cross-section of transactions executed on one workstation. There are three tests in the Mixed Workload suite: No Interference, Concurrent Random Reads, and Concurrent Random Writes. Mixed-workload transactions were submitted with repeatable-read isolation levels. The random-read and random-write transactions ran in the same isolation level.

For the No Interference test, a workstation runs a mixed workload of 12 database operations, including queries, updates, and an aggregate report joining two tables. We record the time to run all 12 operations. This provides a baseline against which to compare the effect of concurrency on the workstation.



For the Concurrent Random Reads test, we run the Random Read queries on 36 clients but add a think time to force the overall TPS rating seen at the server to 7.2 TPS. We let the 36 workstations execute for 3 minutes to bring the database cache to a stable state before we add a thirty-seventh workstation running the same Mixed Workload routines used in the No Interference test. When the thirty-seventh test is finished, we stop all stations and record the TPS rating of the clients. This rating lets us see how the locks generated by the Mixed Workload suite affect the clients submitting the random-read queries.

The Concurrent Random Write test is the same as the Concurrent Random Read test, except that we run random-write operations on the 36 clients rather than random-read queries. The workstations running both the Concurrent Random Read and Concurrent Random Write tests access just one of the two tables that the Mixed Workload station accessed.

The Mixed Workload results were almost identical to the Ad Hoc Query results. The only difference was that Ingres Server edged out Oracle7 on the No Interference test. As Ingres Server could not complete the full Mixed Workload suite because of the DOS client software bug, no performance numbers are presented.

Sybase SQL Server's Concurrent Random Write scores were faster than its Concurrent Read scores due to lock escalation. During the Random Write tests, a lot of exclusive locks were taken on the table, with the result that the pages locks were escalated to a table-level lock. This allowed the program to complete the query more quickly and thus remove locks faster. The downside is that Sybase SQL Server experienced a drastic dip in the TPS rating of the clients, from 7.2 TPS to under 1 TPS; Watcom SQL was the only other product to experience a similar dip, to 4.9 TPS (these results are not shown).

Oracle7's read-consistent model and record-level locking helped it breeze through the test. Its query times remained basically unchanged, even with a load. (Oracle7's database model does not use blocking. If a transaction sees that a page has been modified, the engine gets the image of the row from the row-back segment.)

DB2/2's concurrent random writes were a little faster than its concurrent random reads. While it has record-level locking, the locking of the mixed workload blocked some of the workstations from doing updates. The TPS rating for its concurrent random writes was lower because of contention. This in turn put less of a load on the server, allowing the queries to complete faster. OnLine and Watcom SQL also use record-level locking.

about the change, or if the database crashes midstream, a ROLLBACK command can be issued, returning the database to a pretransaction state. This is an important feature for data integrity, because sometimes transactions are only valid in batches—for example, in a banking application where one account is debited and another credited. If both transactions cannot be performed, transaction processing gives you the option of performing neither of them.

SQL databases store changes to the database in a transaction log. The most common use of the transaction log is to restore the database in case of a system crash. The latest backup is restored from tape, and then the changes in the transaction log are reapplied to bring the database up to date. Transaction logs can also be used for auditing purposes—keeping track of who does what to the database when. Some SQL databases such as OnLine, Oracle7, and Sybase SQL Server also support an additional fault-tolerance feature called *mirroring*, which writes data to two locations, typically two physically separate disks. If one data set becomes corrupted for any reason, the system can switch over to the mirsored copy instantly.

Triggers, procedures that are automatically executed when certain SQL operations are performed, are another important integrity feature. To understand triggers, it's important to remember the relational nature of SQL databases and the joined-table scheme they use to minimize data storage space. Often, tables are joined in a one-to-many relationship, where one parent record (for example, a customer record) is joined to many child records (for example, order records). The tables are joined by a key, a column such as Customer Number, that exists in both tables. A database maintains what is called *referential integrity* (RI) by ensuring that there are no orphans: child records with no associated parent records.

There are endless debates on how to implement referential integrity in databases. Triggers are used by Sybase SQL Server and Ingres Server to enforce RI.

The ANSI SQL standard calls for a different means of enforcing RI through an enhanced SQL syntax that supports "primary" and "foreign" keys. This method, termed "declarative referential integrity," is easier to set up, administer, and analyze, and is supported by DB2/2, Oracle7, SQLBase, and Watcom SQL. OnLine supports neither triggers nor declarative referential integrity; it's the responsibility of the front-end developer to write code that enforces RI.

MOST SQL DATABASES ARE HIGHLY TUNABLE, ALLOWING DBAs TO TWEAK EVERYTHING FROM CACHE SIZE TO THE NUMBER OF THREADS ALLOCATED.

Because mission-critical applications often contain sensitive data, auditing and security are also important issues. Oracle7 and Ingres Server have built-in auditing capability. Sybase SQL Server doesn't have built-in auditing, but auditing is easily programmed using triggers.

FAST RETRIEVAL

Because SQL databases are often used to store huge, enterprise-wide databases, the time it takes to retrieve data is crucial. SQL databases always include some sort of optimizer to determine the best access route. The first optimizers were syntax-based (also called rule-based) and rewrote queries based on syntactic rules governing the fastest access path. Then Ingres developed a technology called cost-based optimization, which uses information about the data stored in the tables to aid in determining the optimal access path. The I/O "cost" of each access path is estimated, and then the "cheapest" path is chosen.

All the products we reviewed except Watcom SQL now support cost-based optimization. An incremental point release of Watcom SQL, which will be available by the time you read this, will incorporate a cost-based optimizer. Most cost-based optimizers utilize only table-level statistics, such as the number of rows, the number of columns, and the minimum and maximum values within a column. Ingres Server and Sybase SQL Server have gone a step further and store histograms of the data itself.

Stored procedures, which reduce network traffic and eliminate compile time, are another feature that speeds up database access. Stored procedures are compiled SQL, 4GL (fourth-generation language), or 3GL code that is stored on the server and loaded into memory when the database is started.

All the SQL databases we looked at except for Watcom SQL and OnLine support some type of stored procedures. Ingres Server, Oracle7, and Sybase SQL Server can all store compiled 4GL code on the server. DB2/2 can store compiled 3GL code such as COBOL or C in the form of DLLs (dynamic link libraries). SQLBase cannot store procedures with branching logic, but it can store individual SQL statements that can be chained together.

TUNING TOOLS

Most SQL databases are highly tunable, allowing database administrators to tweak everything from the cache size to the number of threads allocated. The trick is knowing what to tweak, and to determine this a performance monitor is handy. Only Oracle7 and OnLine include database monitoring tools. Oracle7's monitor has a unique "what if" capability that estimates how the system will respond to hardware changes such as additional memory. Third-party tools are available for all products lacking built-in monitors, however. Sybase SQL Server provides some performance information via a pair of stored procedures that are bundled with the product. Microsoft SQL Server for NT has an especially impressive performance monitor that provides graphical views of disk I/O, cache hits, and many other tunable parameters.

Client/server SQL databases are a complex but increasingly important part of the PC landscape, and the purchase of a SQL database involves a huge commitment in time and money. Right-sizing is a big investment that can actually pay for itself in a relatively short time—but only if the right SQL database product is chosen. The following set of reviews and performance analyses can help you make the right choice.

Getting What You Pay For

by Sheryl Canter

Not only are SQL databases technically complex, their pricing is also complex. What you'll pay varies by the number of clients you want to connect and your choices among the often bewildering array of add-ons and options.

What's more, products that seem expensive at first glance appear much less so when you consider their speed. We look at SQL database cost in two ways: total dollars and price per transaction. Price per transaction is computed by taking the total cost and dividing it by the numbet of transactions per second (TPS) in the Random Read performance test. The value obtained is useful for ranking products on bang for the buck.

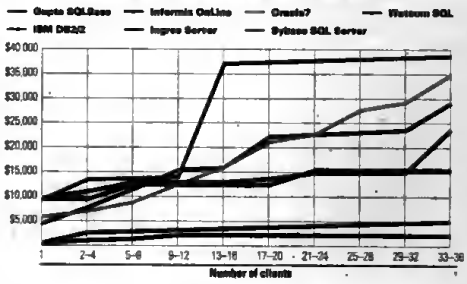
ADDING UP THE PIECES

Vendors differ greatly in how they package and price their products. For some, such as Gupta, the server software price includes the cost of the networking software. Others, such as Ingres, sell the networking component separately. Oracle takes yet another approach, hundling SPX/IPX along with the server software and selling TCP/IP as a separate package.

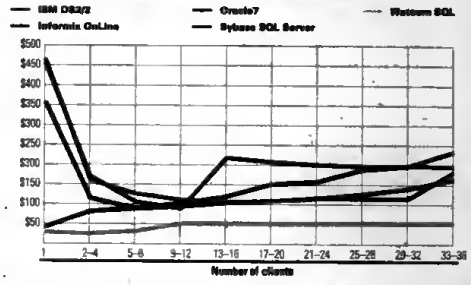
All prices shown (in the graph "Price by Number of Clients" and the Summary of Features table) include server software, minimal networking software, development software needed to use a 3GL programming language such as C, and the minimum technical support option that includes telephone support. Pricing is further broken out by the number of installed clients. Ten increments are shown, ranging from 1 to 36 clients. All prices also include the cost of seven development packages, reflecting the typical size of a corporate development program.

Though Syhase has recently dropped its server prices, Syhase SQL Server still comes out as the most expensive package for 13 to36 clients. This is due to the large jump in price after 12 clients, although at 36 clients Syhase SQL Server and Oracle7 are very close. After that, the Sybase product's price has topped nut while Oracle7's continues to climh. Ingres Server's price tracks closely to Oracle7's, though Ingres Server is less expensive fnr more than 20 clients.

Price by Number of Clients



Price per Transaction



Watcom SQL was by far the least expensive product in this roundup, with DB2/2 costing only slightly more. SQLBase and OnLine track each other closely as midpriced SQL databases.

BANG FOR THE BUCK

When you factor server speed into the price, the differences between the products become much smaller, thnugh the ranking is unchanged (see the graph "Price per Transaction"). We used the Random Read test as our indicator of performance, dividing the total price by the number of transactions per second achieved on this performance test. Ingres Server and SQLBase are missing from this chart because they could not complete the multiuser portion of our performance tests.

Oracle7 and Syhase SQL Server are still the highest-priced products, hut by only a small margin because of their excellent performance. Syhase SQL Server's price jump above 12 clients makes it an expensive choice for 13 to 28 clients. DB2/2 does not appear to be so dramatically inexpensive nn this graph, because of its slower speed. DB2/2 and OnLine are virtually identical in price per transaction, although OnLine costs more in absolute dollars. Watcom SQL is still hy far the cheapest.

For less vital applications, the cheaper packages (in absolute dollars) look enticing. But if time is money, you may want to make the larger investment up front.□

Distributed vs. Replicated Databases

by Richard Finkelstein

Many organizations now have databases distributed among multiple sites, yet they need to query and update them as though they were a single database. The classic solution is a distributed relational database management system (distributed RDBMS). These systems attempt to treat networks of databases as though they were local with respect to data consistency.

The problem with this approach lies not so much in theory as in hardware. Most wide area networks simply lack the speed and bandwidth to support the traffic needed for distributed transactions and joins. A failure at any one of the distributed servers also means that no transaction involving data on that server can occur anywhere.

These limitations are causing a shift toward another paradigm: replicated databases. Instead of attempting to synchronize dissimilar databases, replicated systems keep multiple copies of relevant data at every site where it is needed. Each system has its pros and cons.

PROBLEMS, PROBLEMS

As currently implemented, distributed RDBMSs pose a number of problems, quite apart from the obvious headache of supporting and administering geographically separated databases. Fundamentally, it is difficult to join tables that are located on different computers while still achieving acceptable performance. To execute a query, the distributed RDBMS must first locate the computers that contain the desired database tables and then determine the best way to retrieve the data from each individual database. Other factors include the selection of the best computer to use to join the data, and the cost of the network lines required. This process is called distributed query optimization. But even distributed RDBMSs with distributed catalogs and intelligent optimizers may not perform well, because of network limitations.

Another serious problem is maintaining database integrity when executing a transaction that updates multiple databases. If, for example, one of the databases becomes unavailable during a transaction, then all updates to the other databases must be rolled back in order to maintain synchronization.

Distributed databases implement a two-phase commit to manage this. The first phase prepares all databases for updates. The second tells the database to commit the transaction, physically writing the updates to disk. This can be a slow, expensive process when messages are being transmitted between remote computers. If one of the databases is not available, then all transactions associated with that database throughout the distributed environment grind to a halt.

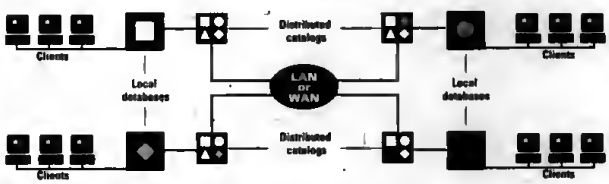
REPLICATION PROS AND CONS

By putting copies of data at every site, replicated systems can make data available for transactions and queries even when one site is down. In a data replication environment, a transaction updates a primary database first. The data is then replicated on secondary databases, which can be local or remote. Data replication can be performed immediately or can be deferred to some later time. If a secondary database server is not available because of unscheduled downtime, the replication is automatically deferred until the server becomes available.

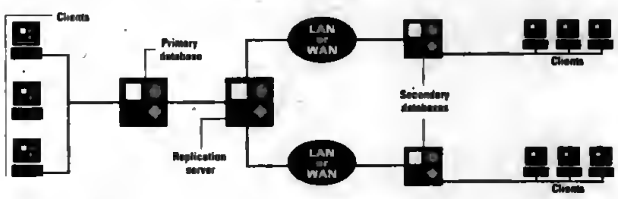
Replication requires the same database structure at each primary and secondary node. Unlike distributed transactions, applications in a replication environment cannot update more than one site within a single transaction, because there is no two-phase commit.

Both distributed and replicated databases are difficult to manage, and there are currently very few deployed applications that actually use these technologies. As techniques and knowledge improve, distributed databases may get wider use. Today they should be approached with caution. □

Distributed Database



Replicated Database



▶ SUMMARY OF FEATURES

CONTINUES

Client/Server Databases

Products tested in alphabetical order

■ = YES □ = NO	Gupta SQLBase Server for NetWare	IBM DB2/2	Informix OnLine for NetWare	Ingres Server for OS/2	Oracle7 for NetWare	Sybase SQL Server for NetWare	Watcom SQL Network Server Edition
List price (tested configuration)	$15,490	$5,083	$23,723	$29,198	$34,922	$38,717	$2,239
SQL Implementation							
ANSI compatibility							
ANSI Level 2 with Enhanced Integrity Addendum	■	□	□	□	■	□	□
ANSI Level 2	□	□	□	□	□	□	□
ANSI Level 1	□	■	■	■	□	□	■
DB2 compatibility							
DML compatibility with DDL referential integrity	Partial	Full	None	Full	None	None	None
Syntax compatibility enforced by DBMS	□	□	□	■	□	□	□
EBCDIC sorting	■	■	□	■	□	□	□
Supports BLOB data types	■	□	■	□	■	■	□
User can define completely new data types	□	□	□	■	□	■	□
User can define data types based on existing types with range limits	□	□	□	■	□	■	□
Supports advanced mathematical and statistical functions	■	□	□	□	□	□	□
Supports user-defined functions and operators	□□	□□	□□	■■	□□	□□	□□
Cost-based/rule-based optimization	■□	■■	■□	■□	■■	■■	□■
Transaction Management							
Locking							
Record-level	■	■	■	□	■	□	■
Page-level	■	□	■	■	□	■	□
Table-level	■	■	■	■	■	■	□
Adjustable for each table	□	□	■	■	□	■	□
Automatic lock escalation	■	■	□	■	□	■	□
Consistency levels supported							
Cursor stability (record-level share locks)	■	■	■	□	□	■	□
Repeatable reads (records locked until checkpoint)	■	■	■	■	□	■	■
Multiversioning (updates not blocked by reads)	■	□	□	□	■	□	□
Release locks (transaction releases all locks)	■	□	■	□	□	□	■
Uncommitted reads (user can read uncommitted data)	□	■	■	■	□	□	■
Read-only databases	■	□	■	■	□	□	■
Cost-based deadlock detection schemes	■	■	□	■	□	■	□
Engine can abort transaction causing the deadlock	□	■	□	□	■	□	■
Engine can abort via a timeout option	□	□	■	■	□	□	□
Programming Interface							
Includes a call-level interface	■	□	□	□	■	■	■
Host-language interface							
Supports ANSI-compatible cursors?	■	■	■	■	■	□	■
Embedded SQL languages supported	COBOL	C, COBOL, FORTRAN, REXX	AdA, C, COBOL, FORTRAN, Hyperscript	C	C, COBOL, FORTRAN	C, COBOL	C
Supports backward scrolling in result set	■	□	■	□	□	□	■
Preserves cursor context after COMMIT/ROLLBACK	■	■	■	□	□	□	■
Supports result-set inserts	■	■	■	□	□	■	■
User can insert, update, and delete using an array of variables	□	□	□	■	■	□	■

▶ SUMMARY OF FEATURES

CONTINUES

Products listed in alphabetical order

■ = YES □ = NO

	Gupta SQLBase Server for NetWare	IBM DB2/2	Informix OnLine for NetWare	Ingres Server for OS/2	Oracle7 for NetWare	Sybase SQL Server for NetWare	Watcom SQL, Network Server Edition
Programming Interface (continued)							
Stored procedure support							
Procedure stored in database	■	■	□	■	■	■	□
Embedded select, update, delete, insert	■	■	□	■	■	■	□
Control and flow logic	□	■	□	■	■	■	□
Message and error-code handling	□	■	□	■	■	■	□
Accepts variables and returns values or messages	■	■	□	■	■	■	□
Supports row-at-a-time processing	□	■	□	■	■	□	□
User can call a stored procedure on a remote server	□	■	□	■	■	■	□
Performs binding and optimization before runtime	■	■	■	□	□	□	□
Offers WAIT/NOWAIT for lock to be released	■	□	■	■	■	□	■
Database Server Environment							
Database server architecture							
Multithreaded architecture	■	■	■	■	□	■	■
Process-per-user architecture	□	■	□	□	■	□	□
Portability							
DOS	■	□	■	□	■	□	■
Microsoft Windows	■	□	□	□	□	□	■
OS/2	■ (16-bit only)	■	□	■	■	□	□
Unix	■	■	■	■	■	■	■
NetWare	■	□	■	□	■	■	□
VMS	□	□	□	■	■	■	□
MVS	□	■	□	□	■	□	□
VM	□	□	□	□	■	□	□
Other	None	None	Microsoft Windows NT	Cray	Various	None	PenPoint
Networking protocols on reviewed platform	APPC, SPX/IPX	APPC, NetBIOS	SPX/IPX	NetBIOS, SPX/IPX, TCP/IP	SPX/IPX, TCP/IP	SPX/IPX, TCP/IP	NetBIOS, IP
Data Storage Features							
Allows database segmentation	■	□	■	■	■	■	■
Supports clustered indexes	□	■	■	■	□	■	□
Supports clustered tables	□	□	□	□	■	□	□
Supports hashed indexes	■	□	□	■	■	□	□
Database Administration							
Includes performance monitor	■	□	■	■	■	■	□
Performance information accessible through an API	■	□	□	□	■	■	□
Keeps tables and logs on separate devices	■	■	■	■	■	■	■
Supports duplexing or mirroring of journals	□	□	■	□	■	■	□
Automatic system recovery with journal logs	■	■	■	■	■	■	■
Automatic media recovery with journal logs	□	■	■	□	■	□	□
Database backup/recovery options							
On-line backup	■	□	■	■	■	■	□
Incremental backup	□	□	■	□	■	■	■
Backup and recovery by database segment	□	□	□	□	■	□	□
Point-in-time recovery	■	■	□	■	■	□	■
Fast recovery options							
User can specify wall-clock time between checkpoints	■	□	■	□	□	□	■

▶ SUMMARY OF FEATURES

ENDS

Products listed in alphabetical order

■ = YES □ = NO

	Gupta SQLBase Server for NetWare	IBM DB2/2	Informix OnLine for NetWare	Ingres Server for OS/2	Oracle7 for NetWare	Sybase SQL Server for NetWare	Watcom SQL, Network Server Edition
Database Administration (continued)							
User can specify number of log records written between checkpoints	□	□	□	□	□	□	□
Indicates estimated time for recovery	□	□	□	□	□	■	■
Indicates percentage of log full	□	■	■	■	□	□	□
Indicates amount written to log	□	■	■	□	■	□	□
Audit trail							
Maintains audit trail automatically	□	□	□	■	■	□	□
Creates audit trail via triggers	□	□	□	■	■	■	□
Import/export file support							
ASCII	■	■	■	■	■	■	■
DBF	■ (import only)	□	□	□	■	□	■
WKS	□	■	□	□	■	□	■
Other	None	IXF	Binary	None	Btrieve	None	DIF, SQL INSERT statements
Security							
GRANT/REVOKE by user	■	■	■	■	■	■	■
GRANT/REVOKE by user group	□	■	□	■	■	■	■
Supports mirroring of database tables	□	□	■	□	□	■	□
Connectivity							
Distributed database support							
Automatic two-phase commit	□	□	□	■	■	□	□
Programmer-controlled two-phase commit	□	□	□	□	□	■	□
Distributed cost-based optimization	■ (limited)	□	■	■	■	□	□
Distributed recovery	□	□	□	■	■	■	□
Distributed deadlock detection	□	□	□	■	■	■	□
Gateways							
DB2	■	■	■	■	■	■	□
RDB/VMS	□	□	■	■	■	■	□
Legacy databases supported							
IMS	□	■ (read only)	□	■	□	□	□
IDMS	■	□	□	□	■	□	□
VSAM	■	□	□	□	■	■	□
RMS	□	■ (read only)	□	■	□	■	□
DBMS Integrity							
Triggers							
Executes triggers automatically for each modification to a table	N/A	N/A	N/A	■	■	■	N/A
Supports multiple triggers for each type of modification	N/A	N/A	N/A	■	■	□	N/A
Offers deterministic control over the sequence of triggers	N/A	N/A	N/A	□	■	□	N/A
Triggers can cascade and trigger other triggers	N/A	N/A	N/A	■	■	■	N/A
Supports recursive triggers	N/A	N/A	N/A	■	■	□	N/A
Can apply rules to table columns	□	□	□	■	■	■	□
Declarative database integrity							
Supports cascading updates and deletes, using rules or syntax	■	■	□	■	■	■	□
RI syntactically enforced by primary and foreign keys	■	■	□	□	■	□	■
Maintains domain integrity	□	□	□	■	■	■	■

N/A—Not applicable. This product does not have this feature.

Oracle Corp.

Oracle7 for NetWare

With some 18 months between the first pre-announcement and the final ship date, Oracle7 was long in coming. Still, we found it to be well worth the wait. The NetWare version we tested blazed through our performance tests, leaving most of its competitors far behind. The many enhancements in Oracle7 include cost-based optimization, stored procedures, triggers, declarative referential integrity, and group-level security. Version 2 of SQL*Net, which will ship by the end of this year, will reduce Oracle7's large per-connection memory requirements by about a quarter. Even with the many new features that were added, we found Oracle7 to be exceptionally stable.

Oracle7, which runs on numerous platforms and provides gateways to many other engines, leads the industry in cross-platform support. A port to Microsoft Windows NT is under development as this story goes to press (see the sidebar "SQL on NT: Exploiting the Strengths"). Oracle7 is one of the few SQL database products to support two-phase commit and distributed optimization. You'll pay top dollar for it, but if you need a high-powered SQL database for storing large, mission-critical databases, you won't go wrong with Oracle7.

READ CONSISTENCY CREATES

One of the most disputed issues in the SQL database industry is the proper way to ensure read consistency while multiple users are accessing and updating a database. Most SQL databases use share-level (read only) locks for this purpose. Oracle takes a different approach, a versioning methodology that ensures that the database appears the same from the beginning of a transaction to its end.

Oracle accomplishes this through the use of rollback segments. Updates are not blocked by share-level locks, but if a transaction discovers a changed record while reading through the database, it looks at the rollback segment to find the version of the data that existed at the precise time the query was started. The risk of this approach is that the rollback segments will run out of space, though this is a rare situation in practice. Rollback segments can be set to any size by the database administrator.

Oracle7's support for distributed databases is especially strong, with options for both two-phase commit and snapshots (data replication). Data replication is flexible; you can choose whether to replicate whole tables or individual rows. A distributed optimizer is used in order to speed cross-server joins.

NEW WITH ORACLE7

Until Oracle7, the Oracle server had only a rule-based optimizer. Oracle7's new cost-based optimizer stores numerous statistics, including some information on the data itself, along with the usual indexes, number of rows, number of columns, and other table-level statistics. The optimizer keeps track of the range, and the minimum and maximum values of data elements. It doesn't store histograms of the data as do Ingres Server and Sybase SQL Server, but histograms are planned for a future release. A "hinting" option lets you improve the optimization by passing to the optimizer information about the data that it wouldn't have otherwise garnered.

ORACLE7'S SUPPORT FOR DISTRIBUTED DATABASES IS ESPECIALLY STRONG, WITH OPTIONS FOR BOTH TWO-PHASE COMMIT AND SNAPSHOTS.

Rule-based optimization is also supported. Statistical- or rule-based optimization can be applied on a SQL statement, session, or system-wide basis. This gives you the option to hand-tune queries, and it also provides backward compatibility with Version 6.0 databases.

Oracle7's new trigger support is unusually flexible. You can specify that triggers fire before the statement causing the trigger, after, or for each row. Event alerters are also new with Oracle7; clients can register to receive notification of different database events. The Oracle7 implementation of stored procedures is especially powerful. You can store packages of procedures and functions, rather than just single procedures. And you can create global variables that are accessible by the entire package rather than having to pass parameters. But unlike Sybase SQL Server, Oracle7's stored procedures cannot return multiple result sets.

SUITABILITY TO TASK

Oracle7 for NetWare

	POOR	FAIR	GOOD	EXCELLENT
Enterprise-wide apps	●	●	●	●
Departmental apps	●	●	●	○
Decision-support apps	●	●	●	●
Mission-critical apps	●	●	●	●
Transaction processing	●	●	●	●

In Oracle7, the access paths of previously submitted SQL queries are now cached in a common memory area called the "Shared SQL Pool." This technique gives many of the benefits of stored commands, with the difference that the Shared SQL Pool is filled on the fly. If a newly issued SQL query matches one already optimized and cached, the cached version is executed and a step is saved. Otherwise, the SQL statement will be optimized and executed, and then stored in the Shared SQL Pool. Version 6.0 had separate caches ("context areas") for each user, and thus took more memory.

In addition to improving performance, Oracle7 makes things easier for the database administrator. The performance monitor, though still character-based, has been enhanced with optional pull-down menus. Performance statistics are also available through virtual tables that can be accessed via SQL SELECT statements. This lets you collect time-series data on server performance to aid in tuning.

Oracle7 has group-level security, an important feature missing from Version 6.0. User profiles, also new with Oracle7, give DBAs extensive control over what a user can and cannot do. For example, a user could be allowed to update tables but not create them—or perhaps create tables of only a certain size or smaller. Or the DBA could limit a user to a maximum of 10,000 I/Os or two minutes of CPU time per query. Only Ingres Server has a similar capability.

The new built-in auditing feature lets DBAs track who's doing what, without programming. You can identify which user is executing a bad transaction, monitor the commands issued by a particular user, or track activities performed most often and tune the database accordingly.

In addition to many features other SQL databases lack, Oracle7 has virtually every feature offered by its competitors except for backward- and forward-scrollable cursors, mirrored databases, and user-defined data types, functions, and operators.

A SPEED DEMON

All of our testing of Oracle7 was done with its new "discrete transactions" feature turned off, as some industry experts feel that discrete transactions are too restrictive to use in mission-critical production applications. Even without this optimizing feature, Oracle7 left most of its competitors in the dust. What's more, Oracle7 achieved its spectacular results with almost no tuning.

On the Mixed Workload test, for example, Oracle7 was so fast that it barely appears on the graph of the results. Sybase SQL Server was the only product to beat Oracle7 on any of our tests, soaring above Oracle7 in the Random Reads benchmark test because of its use of clustered indexes. But Sybase SQL Server was at 90 percent CPU utilization during this test, while Oracle7's CPU utilization was at only 15 percent. This suggests that Oracle7's random-read performance would respond excellently to a faster disk I/O subsystem.

FACT FILE

Oracle7 for NetWare

Oracle Corp., 400 Oracle Pkwy., Redwood Shores, CA 94065; 800-672-2531, 415-506-7000; fax, 415-506-7200

List price: Server software, connections to 36 clients, 7 precompiler development packages, and telephone support, $34,922.

Server requirements: 386-based PC or better, 12MB RAM, 30MB hard disk space, NetWare 3.x.

In short: Oracle7 for NetWare was long in coming, but it delivers on all its promises. Feature-packed, stable, and extraordinarily fast, Oracle7 packs the power needed for downsizing enterprise-wide, mission-critical databases. This new release adds a cost-based optimizer, declarative referential integrity, triggers, stored procedures, and group-level security. Though you will pay top dollar for it, Oracle7 delivers the goods.

One reason for Oracle7's exceptional performance is its read-ahead capability. It can read multiple pages into memory at a time, whereas Sybase SQL Server reads only one page at a time. Another reason is that its network component, SQL*Net, can send large chunks of data across the network at once; the number of rows sent is tunable. Sybase SQL Server, in contrast, sends only 512 bytes at a time.

Oracle7 has well over 100 configuration parameters, but in most cases you won't need to change more than a dozen of them. New users can usually get away with the defaults, but Oracle7 is really meant to be used by professionals who need its flexibility to optimize the performance of large, complex databases.

Both neophytes and old pros will appreciate Oracle7's excellent documentation. The manuals are comprehensive and well-written, with detailed descriptions of concepts and many examples. The manuals don't stop at listing the available options; they show you how to use the options in different situations, and how to interpret diagnostic output, such as access plans.

If you don't need the power and cross-platform connectivity of Oracle7, you could select a lower-priced SQL database. But if you need a crash-proof engine for quick access to huge databases, Oracle7 is an excellent choice.

Reprinted from PC Magazine, October 12, 1993.

Stan Schatt

Phone home

E.T. would have a far easier time calling the home office today, no matter how remote the location, thanks to branch office routers.

Of the companies migrating mission-critical applications from mainframe to LAN platforms, more than 60% indicate that these applications will be accessed by remote users. The rightsizing trend will increase the branch office LAN traffic as remote LANs replace dumb terminals.

There are slightly more than 1.29 million branch offices in the U.S. While close to 10,000 of these offices have 500 or more employees, this number is dwarfed by the more than 468,000 branches with fewer than five employees.

Clearly it is not a single market, but several diverse markets requiring different types of products. Suddenly, every vendor has a low-end branch office router on the market. 3Com Corp., Hewlett-Packard and Cisco lead the pack, but Wellfleet Communications, Inc. should be jumping into the market shortly.

Is it enough?

If these products could talk, they would promise remote management, plug-and-play performance and inexpensive operating costs. These features might not be enough, however, for network managers whose check-off list includes several features that are not being addressed.

For example, TCP/IP is rapidly catching Novell's IPX as the LAN protocol of the day. Mainframes and minicomputers are still very much a part of the enterprise network causing it to continue to grow in complexity. Many companies have mainframe Synchronous Data Link Control data to send to branch offices, while other offices require routers that can handle DECnet protocols.

What do branch offices need to connect with the corporate LAN? You would think larger offices with heavy network traffic would require high-speed leased lines. But small offices, where E-mail is the only real use of the wide-area link to the home office, should be able to get by with inexpensive dial-up lines.

Only about a quarter of all branch offices take advantage of switched 56 service, and Integrated Services Digital Network (ISDN) isn't even a blip on the screen yet. The relatively low transmission speed found in a majority of branch offices suggests that data compression could be a very important feature for many customers because it would decrease transmission time and thus cut costs.

Should branch office routers routinely be equipped with ISDN interfaces? Vendors seem to think so and continue to highlight this feature, but what do customers think? There are only about 3,300 sites in the U.S. that have ISDN. Company plans to add ISDN during the next 12 months suggest that the odds of hitting the California lottery are probably better than finding a corporate headquarters and its three branch offices that want ISDN and are situated where ISDN is available. Switched 56 appears to offer a better short-term solution for customers because of its widespread availability.

E.T.'s long-range communications device was unique because it was composed of assorted components from other machines, yet it was able to transmit a message that was understood. Today's network managers do not share the same degree of confidence in the interoperability of branch office routers. In fact, router companies appear to be selling branch office equipment almost exclusively to their installed base of customers. Customers with a Cisco 7000 installed at corporate headquarters will purchase a Cisco 2500 branch office router because they know the two will communicate without problems. In order to broaden their prospect base, router companies need to address this problem.

Schatt is a LAN-service director at Computer Intelligence/InfoCorp in La Jolla, Calif.

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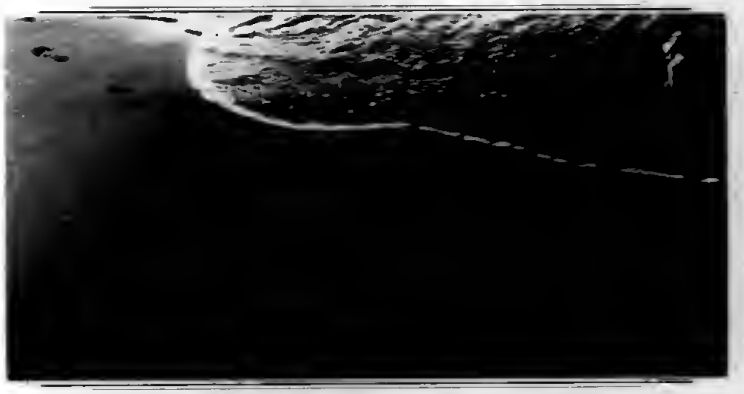

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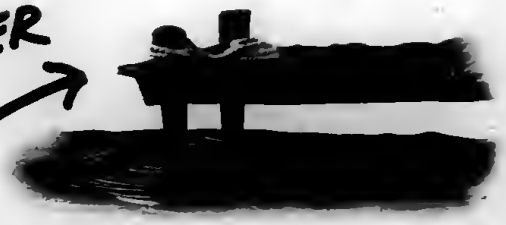

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Briefs

MCI wants competition

MCI Communications Corp. has asked a state regulatory commission in Virginia to permit competition for short-haul toll services in the state. This would enable long-distance companies such as MCI to compete with local exchange phone companies.

IEEE considers proposal

The IEEE 802.11 standards committee approved for standards consideration a high-speed physical layer proposal for frequency hopping spread-spectrum wireless LANs. The proposal was submitted by Proxim, Inc.

The move follows the adoption of a proposed wireless media-access control standard from Xircom, Inc. last November and puts a draft standard on track for completion by year's end.

Video transmission times fall

Compression Labs, Inc. announced an MPEG-2-based Compressed Digital Video product that is said to reduce the bandwidth required to transmit video (up to 270M bit/sec.) by six to 60 times, depending on the complexity of the content and the transmission media.

The Magnitude product family is aimed at several markets, including video-on-demand services and direct broadcast satellite systems.

Xyplex

CONTINUED FROM PAGE 55

The 64K bit/sec. [BRI] speed is ideal for us," Perry said.

Vertex also plans to take advantage of Xyplex's primary rate interface support, which will allow remote basic rate interface (BRI) high-speed connections to corporate headquarters via a single ISDN line. "The BRI support means we will only have to manage one line instead of 12, which is a godsend," Perry said.

Its time has come

Analysts said the modules are another sign that ISDN has arrived and users can start taking advantage of it today.

ISDN has been around for roughly 15 years but has become widely available only over the last year or two, observers said.

"A lot of manufacturers became excited early on and no one bought their product, so they became gun-shy," said Kathryn Korostoff, president of Sage Network Research, Inc. in Natick, Mass. "Now that ISDN is available virtually anywhere with a business site, products supporting it aren't there, and vendors are scrambling to get in the market."

ISDN has received a lot of attention during the last few months. For one, regional Bell operating companies (RBOC) have become more aggressive and vocal about their support plans, and as a result, ISDN is gathering steam nationwide, observers said.

For example, Southwestern Bell has announced plans to install a new architecture designed to provide faster, universal ISDN access. Pacific Bell has announced plans to install four BRI lines in each of 7,400 schools and libraries.

This increased RBOC coverage is in turn creating more attentiveness in the vendor community. For instance, Symplex Communications Corp. in Ann Arbor, Mich., recently announced an ISDN-based internetworking technology called Direct Route designed to deliver faster transmission speeds and lower costs than traditional dedicated and dial-up access services [CW, March 14].

The Network 9000 ISDN modules are available now starting at $8,995. The optional CSU costs $995.

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Ontrack Data Recovery has introduced Ontrack Data Recovery for NetWare, a NetWare Loadable Module data recovery and protection utility for Novell, Inc.'s NetWare 3.11, 3.12, 4.0 and 4.01.

According to the Eden Prairie, Minn., company, users can perform file recovery and file system repairs without bringing the file server off-line.

Users can also copy files from a downed server volume to other servers or volumes on the network or repair file system structures.

The product comprises three diagnostic and repair programs. NetFile displays information on the files and directories in a NetWare volume.

NetScan tests and repairs corrupt file system structures in a NetWare volume, and NetDisk is a sector editor that lets users access and modify data on the sector level.

Ontrack Data Recovery for NetWare costs $395.

▶ *Ontrack Data Recovery*
(612) 937-5161

NetMagic Systems, Inc. has introduced NetMagic, a software tool chest that offers Windows-based, Novell, Inc. NetWare migration and performance utilities that eliminate Novell's DOS utilities and help managers to control their enterprisewide systems.

According to the Peekskill, N.Y., company, one of NetMagic's programs combines all of the functions performed by Novell's Syscon, Pconsole and Fconsole plus command line utilities into a single network management and monitoring tool.

NetMagic can simultaneously duplicate hundreds of users across multiple file servers, and it offers an AutoStart feature that enables a user to specify which charts they want NetMagic to automatically open.

NetMagic costs $695 per client/server.

▶ *NetMagic Systems*
(914) 739-4579

Logicraft, Inc. has introduced Version 2.0 of LanCD, CD-ROM networking software that allows network access to multiple CD-ROM drives.

According to the Nashua, N.H., company, Version 2.0 includes native Banyan Systems, Inc.'s Vines support, giving each Banyan client access to as many as 255 CD-ROM drives per LanCD server and up to 10 servers simultaneously.

Each LanCD server supports up to four different protocols and network connections simultaneously.

LanCD 2.0 costs $1,995 for a 100-user version and $695 for a 10-user version.

▶ *Logicraft*
(603) 880-0300

Network Systems Corp. has introduced two families of remote routers.

According to the Minneapolis company, the fixed-port 6200 branch office routers and the modular 6300 regional office routers offer a menu drive "quick configuration" and auto-installation features.

The products also offer multiple configurations. Dial backup, which re-establishes wide-area network (WAN) connections from the branch to the enterprise, provides a full range of LAN/WAN protocol support.

Pricing for the 6200 ranges from $3,000 to $9,000, and the 6300 is priced from $9,000 to $25,000.

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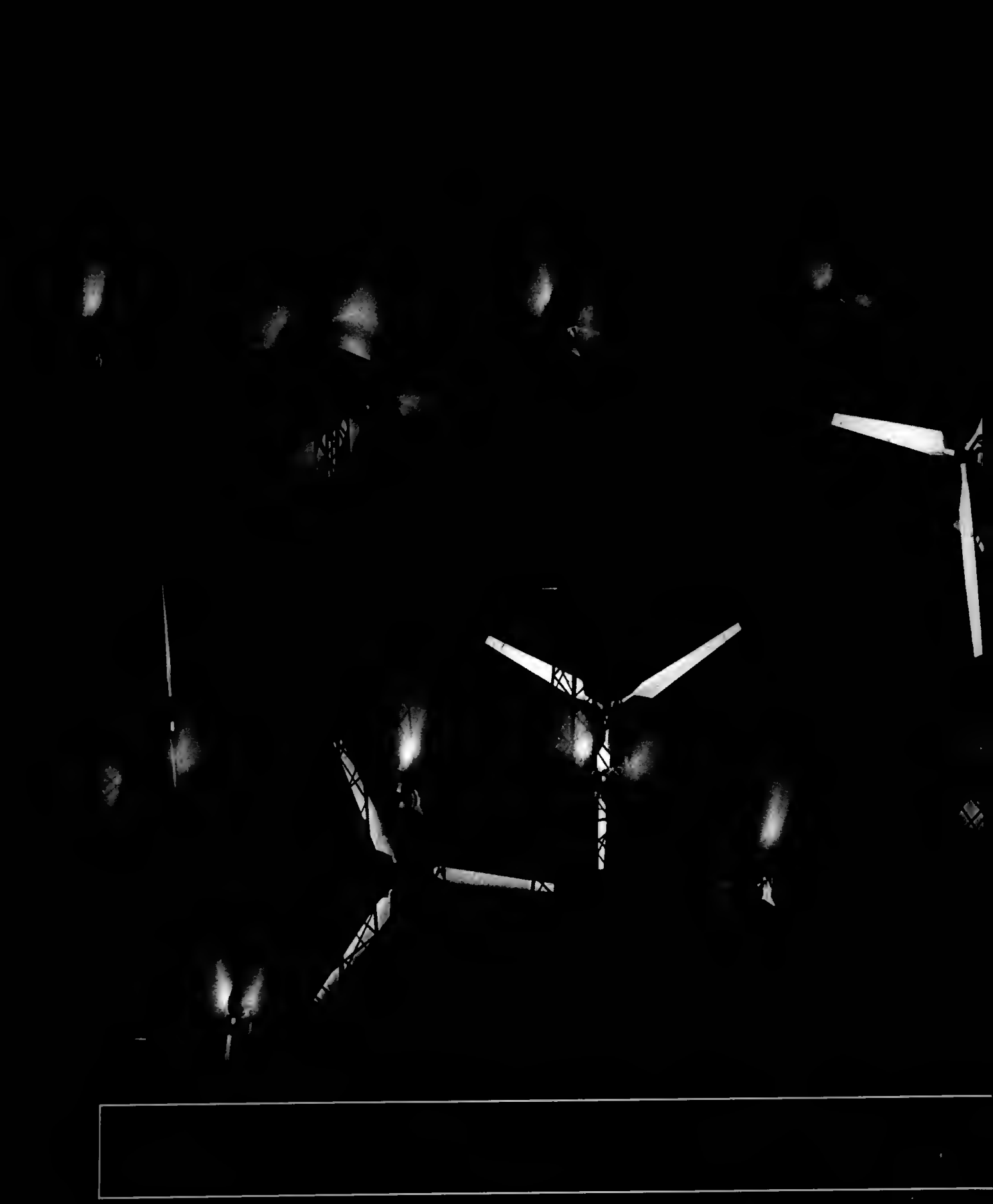

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Tax man finds better way to reach data trove

By Thomas Hoffman
NEW YORK

The Internal Revenue Service said it can wait until May.

No, you haven't suddenly been granted an extension to file your federal income tax returns — they are still due, like clockwork, on April 15. What the agency has targeted for next month is the completed rollout of an executive information system (EIS) that will, for the first time, enable hundreds of IRS executives to electronically access and manipulate nationwide tax data.

While the completion of an EIS project may not seem like a technological milestone, it is a major breakthrough for the IRS. Until recently, regional commissioners and other agency executives were restricted in their ability to compare and contrast tax data. They either had to plow through stacks of paper-based records themselves or enlist the aid of IRS analysts to crunch the numbers.

But thanks to the IRS' new Executive Management Support System (EMSS), agency honchos will be able to quickly identify tax return trends, for example, pinpointing geographic pockets of deadbeat filers. The system has already been rolled out to 500 of the 1,100 IRS executives for whom it was intended.

Lewis Christie, *EMSS project manager. The system enables IRS analysts to spend more time in the field.*

The IRS has never been short on data. But its executives were unable to use it effectively in a real-time electronic fashion. "The problem in the past had been information overload," said Ted Tedesco, assistant regional commissioner for data processing at the IRS' Northeast regional offices here and one of the first EMSS end users to be equipped with a notebook computer for mobile connectivity.

EMSS links DOS-based PCs to an IBM mainframe running a slew of applications and EIS software in a Detroit data center.

PC plenty

Not only do more IRS executives have more usable data than before, but the agency has also managed to complete the project within 3½ years for less than $2.5 million. A good chunk of those expenditures are being funneled toward replacing scores of Intel Corp. 8086- and 88186-based PCs with a mix of 386- and 486-based machines. For example, $180,000 — or 32% of the $569,000 allocated to EMSS in 1990 — went toward PC purchases.

In fact, the project has gone so smoothly that the EMSS project group returned $100,000 in funding last year to the national office in Washington, according to Lewis J. Christie, EMSS project manager.

IRS

- **Challenge:** Executives could not extract and manipulate tax data residing in databases and spreadsheets across multiple platforms.
- **Technology:** System W database software and Commander EIS from Comshare; IBM 3090 Model 600J mainframe; X.25 network; Novell, Inc. NetWare 3.11; Unix-based LANs.
- **Results:** IRS executives can now mine for national and regional tax data using multidimensional modeling software and no longer depend on IRS analysts for number crunching. IRS analysts spend less time supporting executives and more time doing fieldwork with clients.

This came after the project group migrated the EMSS system from an IBM 4381 machine in Brookhaven, N.Y., to a partitioned IBM 3090 Model 600J mainframe in Detroit.

Even though government agencies have historically been viewed as technological laggards, EIS experts describe the IRS project as one of the most innovative in the private or public sector today.

Complexity lauded

"The value of this system is in the multidimensional models that are used," said David Goldstein, an assistant professor of information systems at Boston University's School of Management. Goldstein, who recently viewed the system, said other EIS systems he has seen were "flat" one- or two-dimensional environments. These generally had simpler graphics that were not automatically updated on a nightly or weekly basis like most applications on the IRS system.

The IRS "has developed a much more robust method of mining through the data," he said. Goldstein said he has evaluated a number of EIS systems during the past few years, including those used by Frito-Lay, Inc., JC Penney Co. and the U.S. Department of Defense.

The IRS system comprises 10 core applications that cover every

IRS, *page 67*

Thinking Machines introduces database tools

By Craig Stedman
CAMBRIDGE, MASS.

■ Thinking Machines Corp. is depending on Darwin to evolve its massively parallel processors (MPP) into large-scale commercial database servers. Not Charles Darwin, but a new set of advanced database analysis and forecasting tools bearing his august name.

One of the technical MPP pioneers, Thinking Machines recently introduced the Darwin tool set as the lead prong in a three-part strategy to reposition its CM-5 systems as high-end database engines for mainstream applications such as direct marketing, retail, financial services and health care management.

The other parts of the commercial strategy involve new database capabilities, including a deal with Oracle Corp. to support parallel Oracle 7 on the CM-5 line. Thinking Machines said it also is working with Dharma Systems, Inc. to develop a SQL-compliant relational database, called Decision/SQL, that will be targeted at running complex queries across data sets of 50G bytes or more.

All the products are scheduled to ship in the third quarter as the first fruits of a commercial market plan that Thinking Machines outlined in late 1992. In particular, the company hopes the Darwin software's predictive capabilities will give users a reason to choose the CM-5 over machines from better-known vendors such as Teradata, Inc. and Tandem Computers, Inc.

Darwin evolves

Pricing will start at about $100,000. The packages can be used separately or together and includes:

StarMatch: Memory-based reasoning tool that compares database records to find similarities and predict outcomes.

StarNet: Uses artificial neural network technology to find patterns and identify matching predefined traits.

StarTree: Uses classification and regression trees technology to sift data and create rules for segmenting groups of data records.

StarGene: Genetic algorithm tool for optimizing forecasting models.

Darwin, which consists of four packages sold as a single product (see box), can analyze a database and then run intelligent algorithms across all of the data records. This will help users predict future events such as customer buying patterns or likely defaulters on bills, according to Thinking Machines executives.

Epsilon, a unit of American Express Co. that implements large databases for its parent firm and other customers, has started evaluating the Darwin tools as part of a pharmaceutical data marketing project. The evaluation is expected to last another six months, but Darwin looks "very promising," said Timothy Hult, president of high-performance computing at Epsilon in Burlington, Mass.

Analysis valued

"Teradata offers a high-performance query engine but not an analytic engine," which Darwin appears to provide, Hult said. "What we get excited about is when you can combine [the querying and analysis capabilities]. Otherwise, you're not getting full leverage out of your information."

Epsilon also plans to "put a lot of scrutiny" on both the Oracle 7 and Decision/SQL databases, Hult added. Oracle 7 "is a very critical element," he said. "If we can make a commercially viable database work on the CM-5, that will be a big step forward." An existing CM-5 database that Epsilon built for American Express was based on in-house hierarchical technology, Hult noted.

Howard Richmond, a high-performance computing analyst at Gartner Group, Inc. in Stamford, Conn., said Darwin represents "a very significant step forward in the type of analytical tools that are going to be available" for customers with large databases.

Commitment questioned

However, Richmond added that he expects other vendors such as SAS Institute, Inc. and IBM to eventually release similar tools. Thinking Machines also faces a challenge to convince corporate users that it is "not a scientific vendor that's dabbling in the commercial marketplace," he said.

That will be tougher because major companies such as IBM and Amdahl Corp. are also trying to horn in on Teradata's domain — IBM with its new SP2 and parallel System/390 machines and Amdahl through a joint server project with Oracle and NCube. "The airwaves are going to be very crowded," Richmond noted.

Robots deliver medicines, savings to hospitals

By Mitch Betts

With hospitals under intense pressure to cut costs, it makes little sense to have nurses walking down long corridors to deliver food trays, medications and lab supplies. Not when it can be done by a robot that works for $5 an hour, even on the midnight shift.

So far, 20 hospitals across the U.S. have installed robotic couriers made by Transitions Research Corp. in Danbury, Conn., for routine deliveries, and six more have placed orders.

For example, there is "D.T.," who delivers intravenous drug solutions to nursing stations at the University of California at San Diego (UCSD) Medical Center. "He's a great employee. He never calls in sick or is late for work," said Robert Miller, director of the medical center's pharmacy.

Unlike guided vehicles that require tracks or preprogrammed routes, Transitions Research's HelpMates are autonomous. The 5-foot-tall robots navigate from point to point using a map of the building to plan the best route and sensory feedback to follow that route.

The digital map of the corridors is either imported from the hospital's own computerized floor plan or built from scratch. Optical vision and ultrasonic proximity sensors allow the robot to detect walls, corners and unexpected obstacles.

The robot's brain is a Motorola, Inc. 68000 processor and proprietary software written mostly in C. An add-on module allows the robot to use a spread-spectrum radio transmitter to call an elevator.

With a 12-hour battery, the HelpMates move at an average speed of 2 feet/sec. and have a synthesized voice that can speak 16 phrases, such as, "My path is blocked, please move."

Philip Anderson

Doorstop

The robots' biggest limitation is that they cannot open a door unless it has an automatic opener, said David E. Berg, pharmacy director at St. Clares-Riverside Medical Center in Denville, N.J.

At St. Clares, robo-courier "Rex" delivers medications to the nursing stations and returns with unused medications and paperwork. But he cannot go into operating rooms or mental-health wards because of closed doors, Berg said.

Berg also has an Intel Corp. 1486-based PC with new robot manager software from Transitions Research that tracks the robot's movements and alerts the pharmacy staff to any problems, such as when corridor doors close during a fire drill.

"Otherwise, we [would be] operating the robot blind," Berg said.

HelpMates can be rented for $5 per hour, plus another $1 per hour for the elevator controls; the purchase price is $70,000 per robot.

The biggest savings are in labor — not having to hire messengers for odd hours or use highly trained nurses to run errands, users said. For example, Rex was added to the staff to handle weekend and evening deliveries, Berg said.

Robotic couriers are not the only exotic technology for pharmacy distribution. Hospitals can also install automated dispensers — which work like a cross between automated teller machines and vending machines — at nursing stations throughout the hospital.

With the Medstation from Pyxis Corp. in San Diego, nurses enter a security code and retrieve medications in the wards without waiting for pharmacy couriers. Transaction information is recorded and transmitted to the hospital's central information system for inventory tracking, billing and, in some cases, updating the patient's electronic medical record.

The UCSD Medical Center has both a HelpMate robot and a Pyxis cabinet, the latter of which is used for oral medications, according to Miller.

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IRS

CONTINUED FROM PAGE 65

operational function within the U.S. Treasury Department division, including management and administration, information systems, financial management and taxpayer services, according to Christie. The information, which was once spread across disparate Informix Software, Inc. and IBM DB2 databases and Lotus Development Corp. spreadsheets, now resides in a multidimensional modeling database application called System W from Comshare, Inc. in Ann Arbor, Mich.

IRS executives are able to view national and regional tax data by using Comshare's Commander EIS package. Users are connected to the IBM 3090 mainframe through synchronous and asynchronous links to the Treasury Department's X.25-based Consolidated Data Network.

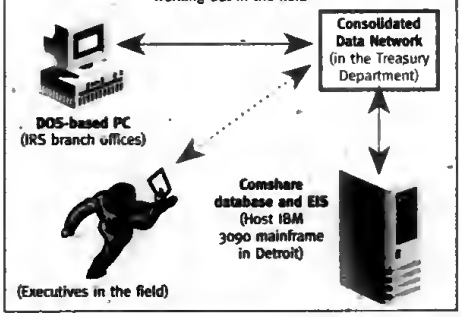
The next step will be to enhance the EMSS system by June with smart a-gent technologies that will further enable the system to conduct preprogrammed, automated analyses on tax return data.

The IRS is leaning toward Comshare's Commander Exception Monitor, smart agent software designed to search for and extract unique data in the EIS system. For example, the smart agents could be instructed to identify regional trends in bankruptcy filings. This would free up IRS analysts to work with clients in the field, Christie said.

To implement smart agents, the IRS is working with Andersen Consulting.

Here and there

EMSS assists IRS executives in branch offices as well as those working out in the field



Briefs

Epoch, Sybase team

Epoch Systems, Inc. plans to port mainframe-based systems management tools to **Sybase, Inc.** very large database environments. Epoch's Enterprise Backup product line will be integrated with Sybase's Backup Server and will be available by the third quarter, the companies said last week.

Massive agreement

Pyramid Technology Corp. in San Jose, Calif., and Europe's ICL said last week they will collaborate on ways of integrating symmetric multiprocessing and massively parallel processing to meet the needs of the largest corporate data centers. The agreement expands an existing technology, marketing and OEM relationship between the two firms.

Biological systems

The recent discovery of a second colon cancer gene was made possible in part by a massively parallel processor system from **MasPar Computer Corp.** A 4,096 processor MasPar system was used by The Institute for Genomic Research (TIGR), which provided John Hopkins University with the gene for its own gene investigations. TIGR uses a program called Blaze from **IntelliGenetics, Inc.** in Mountain View, Calif., a supplier of biological sequencing software.

RAID party

The RAID advisory board has established a 14-member RAID Enclosure Committee, including **AT&T-GIS, Data General Corp., IBM** and **Hewlett-Packard Co.**, to formulate long-range planning.

Tandem in parallel

Tandem Computers, Inc. last month introduced a parallel processing version of its Intelligent Network (IN) servers for telephone companies' call-handling applications. The new version is based on Tandem's Himalaya line of fault-tolerant computers. Priced from $235,000, the IN servers are shipping now, Tandem said.

ASK for it

The ASK Group, Inc. upgraded IBM AS/400-based manufacturing software to include bar code and radio frequency interfaces for shop-floor materials handling.

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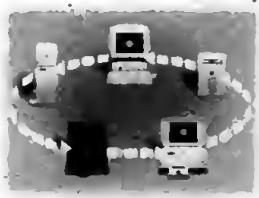

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Sequent's NT venture yields unimpressive sales

By Mark Halper

Sequent Computer Systems, Inc. knew it was taking a chance more than a year ago when it became one of the first hardware vendors to offer a line of systems running Microsoft Corp.'s Windows NT operating system.

So the once-ardent Unix zealot is not surprised now that its foray into the NT world [CW, Jan. 18, 1993] has produced unimpressive sales numbers, according to a company spokesman.

Analysts have estimated that Sequent derived a mere $10 million of its $354 million revenue in the year ended Dec. 31 from its NT-based WinServer line, with the nonservice balance coming from the company's tried-and-true Symmetry series of Unix boxes.

Maybe later
Taco Bell also rejected a Sequent NT box for a data access improvement project last year because Sequent wasn't ready to deliver at the time, said Taco Bell account consultant Rick Smith. The company instead went with a DB2 solution.

A Sequent spokesman last week described that figure as "in the right ballpark" and noted, "We were prepared to respond to a surge in demand, but we weren't surprised on the upside."

Users last week attributed the sluggish campaign to reasons germane to both Sequent's approach (pricing is high, at least one user said) and the NT market in general, which users described as not yet ready for the high-end systems that comprise much of Sequent's offerings.

Lack of track record

Taco Bell Corp., which has considered a 16-processor WinServer box to run a PeopleSoft, Inc. payroll and human resources program, will probably opt instead for either a Unix-based system or a mainframe upgrade, according to Taco Bell account consultant Rick Smith.

The reason, Smith said, is that parts of PeopleSoft do not yet run on Microsoft's SQL Server. Furthermore, he noted, NT lacks a track record in high-end multiple processor configurations and in vital operations such as payroll.

"When you're doing people's paychecks, that is not a time to experiment with new technology," Smith said, noting that Sequent is among the platforms that Taco Bell is evaluating for a Unix solution to its payroll needs.

There was a similar observation from Sequent Unix devotee Mike Higgins, technical support manager at San Francisco-based women's apparel maker Byer California.

"The day NT runs in this shop is the day you won't be able to reach me here anymore," he said, characterizing NT as a desktop system lacking large server industrial strength. "You don't take a tomcat and grow it into a cougar," he added.

One of the early adapters of Sequent's WinServer line was Oregon City, Ore.-based PED Manufacturing Ltd., a maker of artificial human joints, which runs a Microsoft SQL database on a two-processor WinServer accessed by PCs over a Windows for Workgroup 3.11 network.

Dave Howell, PED's MIS director, lauded both the performance of his Sequent box and the technical support that Sequent provides. But, he said, the Sequent line was expensive when he bought his low-end model about six months ago, and it remains so today — especially now that PC server vendors have introduced multiprocessing boxes running NT.

With Digital Equipment Corp. expected to support NT in symmetrical multiprocessing (SMP) configurations on Alpha, and with SMP becoming more prominent in the RISC world, Sequent is facing more competitive pressure than ever to lower prices, Howell noted.

If he were to shop for an NT server today, Howell said he would give equal consideration to products from several vendors including Sequent, Compaq Computer Corp. and Digital.

Contrary to p
this is not the first step in impl

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And, knowing how closely top management

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Techsys, Inc. has introduced Release 5.1 of the Elite Series, an open systems software product designed for the distribution and light/process manufacturing industries.

According to the St. Laurent, Quebec, company, the product emphasizes multimedia technology for automation of sales orders, order entry and inventory management processes.

The Elite Series provides instantaneous retrieval of color images, database voice tracks and black-and-white schematics that can be displayed on any graphics terminal or PC screen, printed to a fax machine or played on telephone systems.

Prices for the Elite Series 5.1 range from $900 to $1,500 per user.

▶ *Techsys*
(514) 333-0000

Compuware Corp. has introduced Release 2.5 of File-Aid for DB2, a DB2 data management and testing tool designed to help programmers move quickly through the application test cycle.

According to the Farmington Hills, Mich., company, Release 2.5 provides currency support for IBM's DB2 Version 3. The product also offers additional browse and edit commands. Programmers can create, customize, populate, refresh and authorize DB2 objects without writing SQL code.

File-Aid for DB2 2.5 prices start at $29,500.

▶ *Compuware*
(810) 737-7300

Boole & Babbage, Inc. has introduced Version 2.2 of AutoOperator MVS, automation software.

According to the San Jose, Calif., company, the software can be implemented and functional for most common automation applications in two to three days.

The product offers an enhanced Interactive Rules Processor that reduces by up to 80% the amount of user-written code necessary to implement basic automation.

AutoOperator 2.2 also features an integrated object-oriented subsystem management component called Continous State Manager that lets users define the ideal state for systems and subsystems through fill-in-the-blank panels.

Pricing for AutoOperator 2.2 begins at $9,800.

▶ *Boole & Babbage*
(408) 526-3000

Systems Strategies, Inc. and **Apertus Technologies, Inc.** have added MVS support to Systems Strategies' Express Data Transfer Services.

According to Systems Strategies in Eden Prairie, Minn., Express Data Transfer Services is a software product designed for establishing cross-platform communications. It is built on top of LU6.2 and provides an open common interface application programming interface for simple LU6.2 programming.

Express Data Transfer Services comes equipped with several applications built on top of the interface, providing high-speed, bidirectional file transfer, bidirectional printing and bidirectional remote job/command submissions.

Prices range from $19,000 to $68,000.

▶ *Systems Strategies*
(612) 828-0300

Product short

DataEase International, Inc. has announced DataEase SQL Connect for IBM's AS/400. The product plugs into any or all of the DataEase DOS, OS/2 or Windows databases, allowing users from their desktops to access, manipulate and integrate corporate information stored on the AS/400. Cost: $1,295. DataEase International, Trumbull, Conn. (203) 374-8000.

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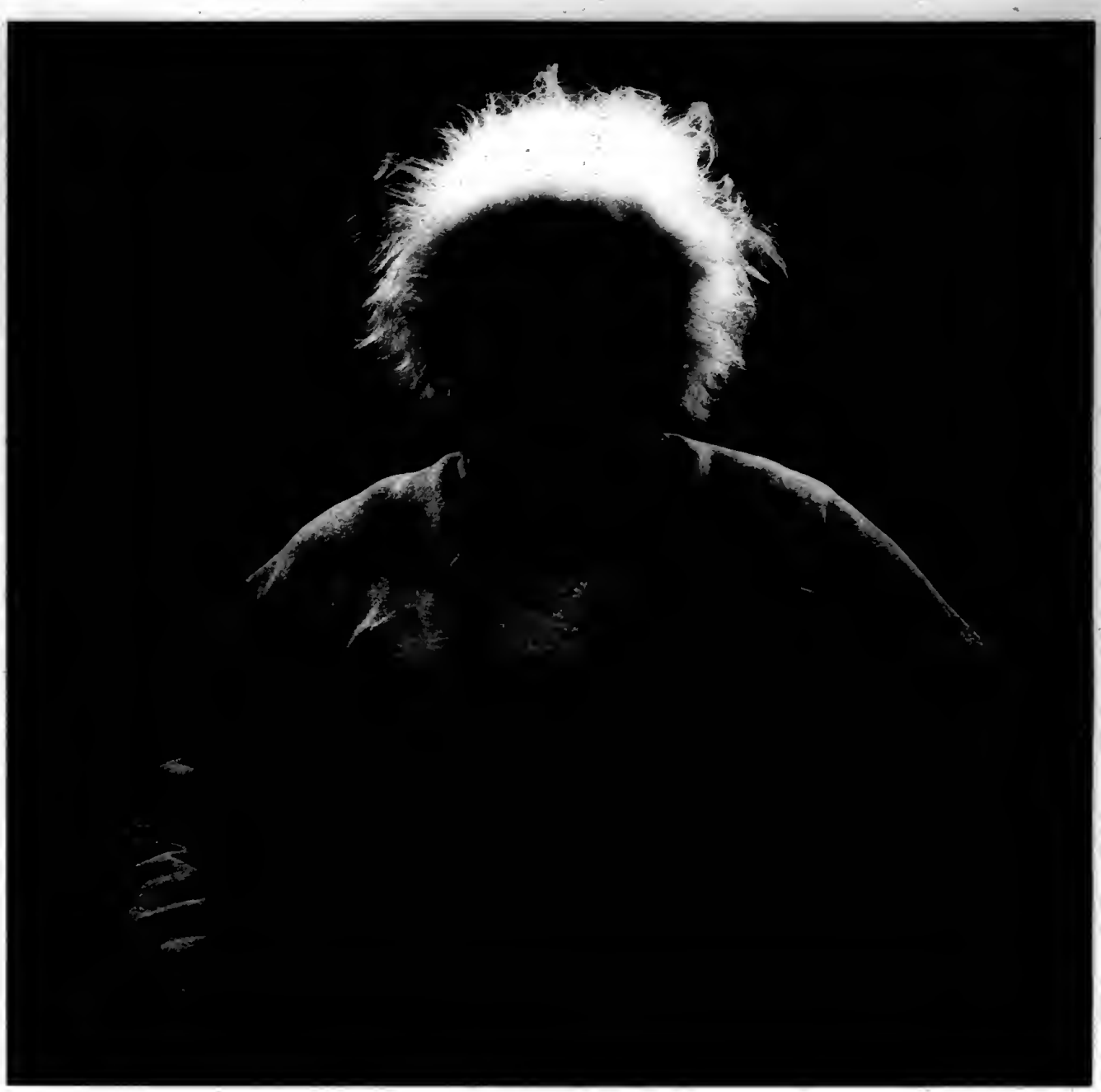

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Repositories come back in fashion

Ease headaches of managing client/server

By Melinda-Carol Ballou

After a long time in limbo, repositories are starting to catch on with corporate developers, who use them to help make the transition to client/server environments.

Corporate developers use their repositories to dynamically model the rules and structures used in their business, track key corporate data and integrate disparate tools, systems and far-flung branch offices. Others said the need to use repositories in new ways will impact their development work and buying decisions over the next year or two.

While some industry analysts said repositories can indeed ease the migraine of managing client/server and distributed computing, they also urged caution. Corporate sites should not expect "silver bullets" in the form of repositories, they said.

Who's in on it

A sampling of key repository players includes the following: R&O, Inc., Brownstone Solutions, Inc., InfoSpan Corp., Manager Software Products, Inc. and Relax Products, Inc. However, according to analysts, no clear leader has emerged.

What it all means

Repositories are emerging as a means to manage the enterprise, and their use has caught on as developers grapple with client/server applications. According to Art Johnson at US West, the "vision" for repository use would extend beyond the limited use of local encyclopedias with traditional CASE tools. For example, using a repository, developers could look up all the projects conducted for a human resources department that include imaging support.

Setting it up

Dan Jones, information resource manager at Norwest Mortgage, Inc. in Des Moines, Iowa, is typical of those who have discovered the repository's new value. Repositories, he said, are evolving from the "separate little encyclopedias" associated with computer-aided software engineering (CASE) tools to an enterprisewide "yellow pages" to locate data.

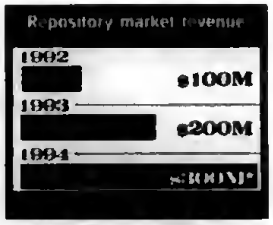
To set up his corporate repository, Jones isolated key business components into people, products and property and built a data warehouse that incorporated data and related it back to those three.

"If I'm a mortgage servicer and want to sell to someone else in the field, I should have the ability to easily supply" requisite information, Jones said. "The repository will tie it all together and synchronize the movement of data."

The increasing reliance on repositories is quite a change from even a few years ago, when the concept got a bad name due in large part to IBM's failure to deliver on its much-touted AD/Cycle repository. But now even hip, market-conscious vendors such as Microsoft Corp. are touting repository strategies, along with tools vendors ranging from KnowledgeWare, Inc. to Sybase, Inc. [CW, March 21].

The Federal Aviation Administration, for example, is setting up a repository as a front-end entryway into its data warehouse. The repository will act as a card catalog to identify where information is stored, said Jerry Moss, manager of IS development at Advanced Testing Technologies, Inc., an FAA subcontractor based in Commack, N.Y.

"The FAA is a very diverse agency with agents spread across the country, and now they are pretty cellularized as far as the sharing of data is concerned," Moss said. "One of the tasks of the repository will be to get them to work together across regional and organizational boundaries." The repository will also be used to integrate a range of tools for developers, Moss said.



Source: Gartner Group, Inc., Stamford, Conn.

But while these and a number of other organizations see repositories as a key tool, industry analysts warned against high expectations.

"Repository vendors like to play the 'Vegematic' game: It slices, it dices and does everything," said Jim Sinur, an analyst at Gartner Group, Inc., a consulting firm in Stamford, Conn. "But have you ever used a Vegematic? It does an OK job at many things but doesn't do a great job at any."

But Moss countered that the repository is only going to be as good as the people and standards applied to it.

Like most technology projects, however, sometimes human factors can interfere with repository development. At a Midwest-based consumer products company, the lack of end-user support stymied the project, according to data administrator Rolan Doffing. His group had looked for and structured a prototype for an "information directory" that was repository-based.

Primarily a people problem

"We want this to be owned by users, who have to supply information and maintain its accuracy and assign resources," Doffing said. "Cracking the information directory nut is tough, but it's not primarily technical; it's a people problem."

But the project may not be dead forever, Doffing said. With management now focusing its attention on other issues, including object-oriented technology, the concept of repository is "creeping back again," this time as a means to keep track of objects.

Evan Evans, senior project manager at Kerr-McGee Corp., a natural resources extraction company based in Oklahoma City, sees a variety of business advantages to implementing an enterprisewide repository. He said he hopes to demonstrate those advantages to management with a prototype his organization is completing. It will show the relationship between business goals, organizations and location, together with process-related information. In this way, managers would be able to determine what would happen if they shut down a branch of Kerr-McGee.

This would give management much more effective tools for determining how to change business processes, Evans said.

Programming languages

Basic tool makes porting to Windows easier

By Ed Scannell

■ Trying to make it easier for DOS Basic programmers to port their programs to Windows, PowerBasic, Inc. has released an improved version of its programming language that is bundled with its developer's kit for Windows 3.1.

The PowerBasic Developer Kit for Windows 3.1, which encapsulates the Windows application programming interface, was designed to simplify programming for event-driven environments.

The tools let developers continue to use most of their familiar procedural programming techniques. Developers need only program in PowerBasic or choose to move their other Basic programs to PowerBasic, and then use the developer kit to convert the programs to full Windows compatibility.

Years of work saved

"Basic programmers have been asking us all along for help in moving their DOS code to Windows," said Bob Zale, president of PowerBasic. "Not too many people want to discard years of exhaustive work just to move to a new platform."

The native-code applications that programmers create with the developer kit have the same execution speed as a native-code compiler running under DOS, according to Zale.

The product is bundled with the Dolce Vita technology from Summersoft of Paris. This technology can act as a server to multiple client applications, something not currently available with many similar Windows tools. Thus, debugging and the development of applications is safer because each application can run in its own virtual machine via the PowerBasic Kit's preemptive multitasking capabilities.

Some corporate developers said the PowerBasic product can make their programming lives significantly easier as their companies aggressively move to Windows environments.

The "real key" to products like the PowerBasic language "is not so much the pretty pictures you get in going to a graphical environment, but the ability to program in a true multitasking environment," said John Hayes, a programmer at Travelers Insurance Co. in Hartford, Conn.

> Developers need only program in PowerBasic or choose to move their other Basic programs to PowerBasic and then use the product to convert the programs to full Windows compatibility

Support available

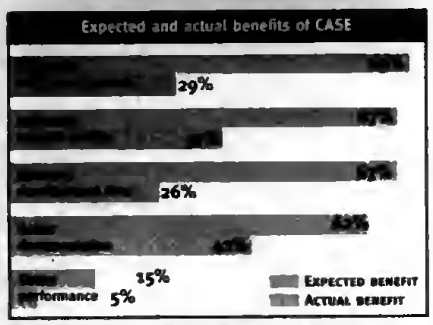
Support for Microsoft Corp.'s Dynamic Data Exchange protocol is included, as is support for clipboard access and Dynamic Data Libraries, including those created by third parties.

Available sometime this quarter, the PowerBasic Professional Edition carries a suggested retail price of $299.

Registered users of PowerBasic 3.0 can buy the developer kit upgrade for $149.

CASE findings

A recently released survey of IS managers by Deloitte & Touche probed computer-aided software engineering (CASE) tool use



Response base: 411 senior IS managers in the U.S. and Canada

Reporter's Notebook

UnixWhere?

Oracle Corp. plans to ship a UnixWare version of its database later this month, according to one Oracle consultant. However, the product will not support symmetrical multiprocessing (SMP) machines, which is virtually the raison d'etre for Novell, Inc.'s UnixWare. An SMP version of Oracle for UnixWare is not due out until mid- to late summer, the consultant said. The product should arrive before Sybase, Inc.'s SQL Server for UnixWare, which is due out by year's end. For other product announcements from Oracle's CODA developer's conference, see *Computerworld*'s April 4 issue.

Applications ready to roll

On April 18, Oracle plans to begin shipping a new generation of client/server financial and manufacturing applications based on the Oracle 7 database. So-called Release 10 of the packages will have an added twist: The modules will be integrated with more specialized applications from third parties under an alliance program announced last week. For example, a generic accounts receivable system from Oracle would be integrated with a customer service package from Aurum Software, Inc. or a graphical query tool from Business Objects, Inc.

Minicomputer users beware

Oracle plans to drop support for Wang Laboratories, Inc. VS users as of Dec. 31 and has already stopped selling new Oracle database licenses for Wang minicomputers. Data General Corp. MV users will be cut off from Oracle support after December 1995, although Data General Unix users won't be dropped. Further, MV users can expect an Oracle 7 port this summer, but the database won't come with on-line documentation or upgraded add-on tools such as SQLnet 2.0 for connecting the database to other operating systems and networks.

—Kim S. Nash

Briefs

PowerPC tools debut

Symantec Corp. has announced new versions of its C++ compiler and tools for the Macintosh, including a migration kit to Apple Computer, Inc.'s PowerPC. The migration kit includes a PowerPC cross-compiler, a linker and debugger that developers can use to move existing applications.

No waiting around for SunSoft

SunSoft, Inc. isn't going to wait for desktop rival Microsoft Corp. to provide compatibility kits for Microsoft's Object Linking and Embedding (OLE) 2.0 object-application link. Instead, SunSoft is developing an as-yet unannounced OLE "proxy" for Sun's object-oriented applications, said Richard Probst, manager of Project DOE development. The proxy will convince Microsoft PCs that they are sending messages to other Microsoft PCs.

Team announces new gateways

Microsoft has teamed with **Information Builders, Inc.** to create two gateway products. They will provide front-end tool and applications access to Information Builder's EDA/SQL client/server software through Microsoft's Windows NT and Open Data Services connectivity software. The EDA/Link Gateway for NT will allow EDA/SQL client applications residing on PCs to access Microsoft's SNA Server to reach data on IBM's MVS, VM and AS/400 platforms via the LU6.2 networking protocol. The EDA/Link Gateway for NT and the EDA/Open Database Gateway for OS/2 and NT will begin shipping in the second quarter for $5,000.

[redacted]

SQA, Inc. has introduced SQA TeamTest 3.0, an automated graphical user interface (GUI) for Gupta Technologies, Inc.'s SQLWindows client/server development environment.

According to the Woburn, Mass., company, Version 3.0 integrates with SQLWindows through an application programming interface (API) provided by Gupta. The API enables automated test procedures created in SQA TeamTest to communicate directly with SQLWindows GUI objects.

Automated tests run unattended, reducing testing time and increasing application quality.

SQA TeamTest 3.0 costs $1,495.

▶ *SQA*
(617) 932-0110

Raima Corp. has announced Velocis, an embedded database engine.

According to the Issaquah, Wash., company, the product links directly with an application program and enables developers to deploy software products that scale from a small stand-alone machine to a large client/server network from a single line of code.

Developers can write their own "Extension Modules" by using SQL, C, C++ and Raima's application programming interface to write custom interfaces to the engine or to get around network performance bottlenecks.

Features include row-level locking, transaction processing and stored procedures. Velocis supports Microsoft Corp.'s Open Database Connectivity SQL interface for interoperability with most popular software development and writing products.

Velocis costs $395.

▶ *Raima*
(206) 557-0200

Sterling Software, Inc. has introduced Answer:Zim 5.0, a multiplatform application development product designed for complex database applications.

According to the Woodland Hills, Calif., company, the software has graphical- and text-based user interfaces to provide user scalability and ease of use.

Answer:Zim enables programmers to develop, deploy and maintain applications with full source portability under different operating systems and on numerous hardware platforms.

Standard features include Entity-Relationship data modeling for rapid creation of mission-critical applications, an object dictionary where all applications objects are coordinated and can be reused to save development time and a fourth-generation language.

Pricing for Answer:Zim 5.0 starts at $1,350.

▶ *Sterling Software*
(818) 716-1616

Softblox, Inc. in Atlanta has announced SmartPad Release 3 for Windows, a utility that allows embedding of custom tool pads into Windows-, DOS- or host-based programs.

According to Softblox, key features in Release 3 include automatic import of Program Manager groups/items; a master button catalog; drag-and-drop configuration and runtime features; automatic buttons; tab-style buttons; and a SmartBar feature that adds on-the-fly macro recording, run command processing and a task manager from within any tool pad.

The Standard Edition of SmartPad costs $95, and the Professional Edition costs $295. The Runtime Edition is available for $25 (one user), $195 (10 users) and $795 (50 users).

▶ *Softblox*
(404) 892-0202

Automation Software Consultants, Inc. has introduced Version 3.0 of The Network C Library for NetWare.

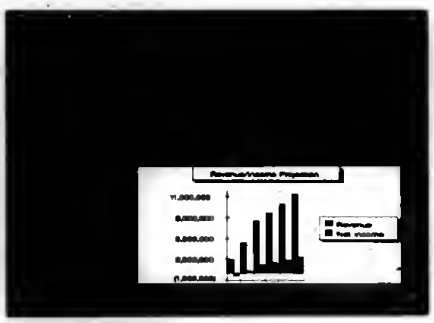
According to the Batavia, Ohio, company, the NetWare C Library is a collection of nearly 400 functions for writing utility programs or commercial applications that need direct access to Novell, Inc. NetWare services and statistics.

Network C Library users can access NetWare accounting services, connection services, console services, bindery management, file server statistics, directory and file management, message and IPX communications services, printing and queue management and semaphores.

Dynamic Link Libraries are included for developing applications for Windows.

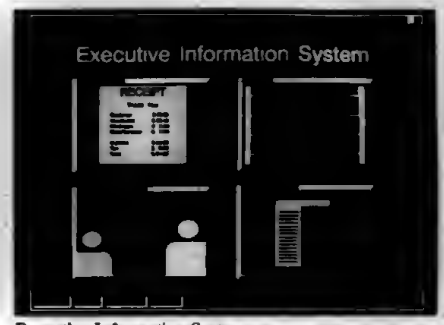
The Network C Library for NetWare costs $395. Source code is available for an additional $275.

▶ *Automation Software Consultants*
(513) 753-6327

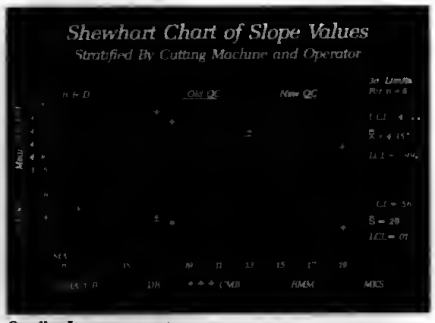


Financial Planning

Econometric and Time Series Analysis



Executive Information Systems



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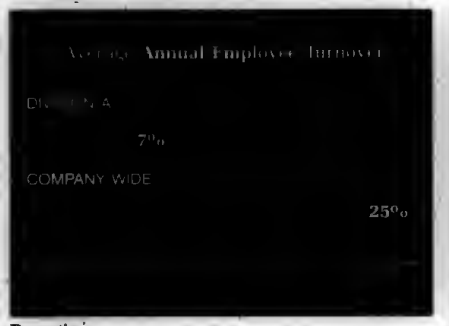

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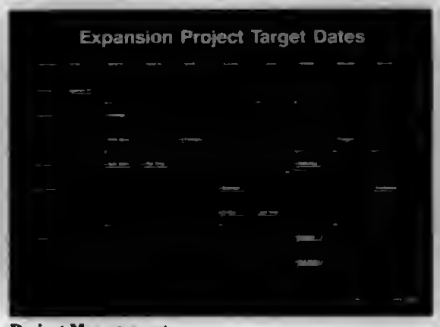

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IDC White Paper

AN INDUSTRY UPDATE

WRITTEN BY

INTERNATIONAL DATA CORPORATION

Systems Management of the IBM Parallel Enterprise

With a flurry of recent and expected new hardware and software announcements, IBM is attempting to reposition the MVS operating environment (now 25 years old) as the enterprise server operating system for the computing infrastructure of the 1990s. These announcements include new parallel servers for transaction and query processing and supporting software. The new MVS operating system is the cornerstone that ties this environment together.

MVS's emerging role presents opportunities and challenges to vendors and IS professionals responsible for guiding information technology (IT) investment and implementation strategies for the enterprise. The opportunities include leveraging an organization's portfolio of mission-critical applications running in MVS environments, the inherent strengths of MVS, and an organization's staff skills in developing and managing production applications in MVS and its supporting subsystems (CICS, DB2, IMS, etc.).

Foremost among the new challenges is managing the complexity inherent in parallel computing architectures—presenting a single system image and single point of control to system managers, assuring high availability of data and computing resources, and managing and balancing the system workload across multiple processors.

This International Data Corporation (IDC) White Paper describes the implications of parallel systems for vendors and IS professionals, presenting the challenges of managing parallel systems environments in the 1990s. It also provides analysis and recommendations for selecting the architecture, products, and vendor(s) of the tools required for parallel systems management. Two solutions immediately available are: the Boole & Babbage Intercommunication Facility (BBI-3, the underlying component of Boole's MainView products, used by the IBM Hursley Lab) and IBM CICSPlex System Manager/ESA (jointly developed by Boole & Babbage and IBM Hursley Lab).

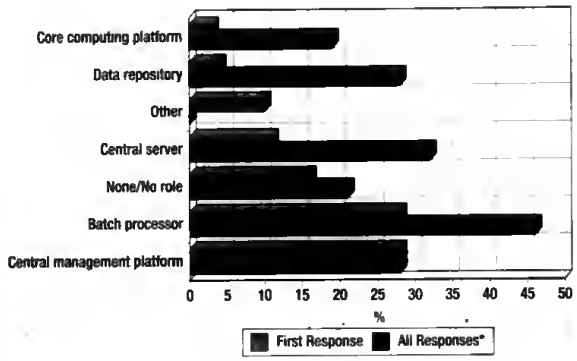
Background

IBM's announcement, *IBM MVS System Open and Distributed Strategy* (293-061), describes the planned positioning for the MVS operating environment as an enterprise server or

The Bottom Line

IDC believes there is a potential for hardware savings with IBM's parallel systems. The parallel architecture requires unique systems management solutions to proactively manage hundreds of MVS systems and hundreds of CICS regions and maintain control of the enterprise information structure. The availability of systems management utilities such as those described in this White Paper will be required to proactively manage the complexity of parallel systems.

Figure 1
Expected Role of Mainframes in Client/Server Environment



N=166
* Multiple responses

Source: *IDC's Client/Server Implementation Survey, Application Development Manager Version*, July 1993

peer processor with other mainframes, minicomputers, workstations, personal computers, and local area networks. As the proliferation of centralized mainframes waned, the business environment diversified to the complex, heterogeneous world of workstations and personal computers. IBM is repositioning MVS and "reframing" the mainframe from the "true blue" mainframe-centric architecture of the 70s and 80s, to the open, heterogeneous enterprise of the 90s (Figure 1).

In April 1994, IBM is expected to announce its parallel family of processors. Based on CMOS (complementary metal-oxide semiconductor) technology, the IBM System/390 parallel processors will be lower-cost, air-cooled alternatives to the traditional mainframe ECL (emitter-coupled logic) technology. This new architecture meshes with IBM's strategy and is focused on moving technical capabilities into the commercial business market. Parallel processing enables numerous processors to simultaneously execute specific operations of a task or transaction without being limited by the speed of a single chip. The net result is a workload split and processed so that the whole is executed faster than the sum of its components.

The Announcement

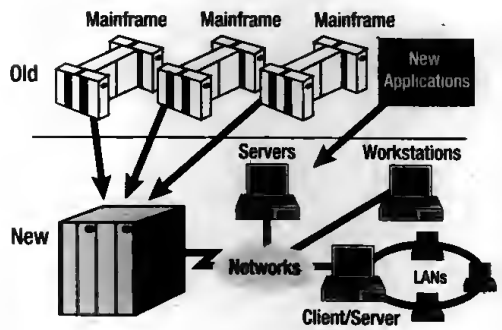
The Parallel Query Server (PQS), estimated availability within 30 days of the announcement, can be connected to any ESCON (Enterprise System Connection Architecture)-capable processor (all models of IBM's ES/9000 and 3090J). Running new versions of MVS and DB2, the PQS is designed to offload DB2 applications from the mainframe.

The Parallel Transaction Server (PTS), available in Q2 1994, can be connected to the ESCON-capable ES/9000 models 511 and 711 processors. The PTS is designed to support IBM's industry-leading transaction processing system, CICS. Future models will support IMS and its transaction manager.

Migrating to Parallel Systems

IBM has already announced strategic directions for new versions of its MVS operating system, DB2 database, and CICS. MVS in the parallel environment becomes a server operating system, the focal point for database, file, and transaction processing services originating from multiple client platforms. End users will have transparent access to existing transaction processing applications and data, regardless of the end-user environment (Figure 2). Running on multiple

Figure 2
Consolidate Old, Distribute New



parallel processors, each MVS image will be a cooperative and peer operating system. For some tasks, an MVS will manage functions as a server; with other tasks it will be a client.

Parallel systems will require a whole new family of software to support them. In addition to the MVS operating systems enhancements, there will also be enhanced versions of the MVS core subsystems such as JES and VTAM. The MVS workload manager will have to balance tasks between multiple MVS operating systems and a coupling technology that will integrate processing of the ES/9000 and PTS.

Transaction processing and database query are well suited for the parallel processing environment. For example, IBM's CICS and its new CICSPlex System Manager can manage routing between parallel systems and subsystem images without requiring a rewrite of the application; they will be immediately available. Batch processing, unfortunately, will require significant analysis and probably design changes to fully take advantage of parallel technology. IBM has already announced systems management software designed to aid the migration and support the parallel processing environment:

- CICS Transaction Affinities Utility MVS/ESA—aids in planning and defining workload management. Its output can be input to CICSPlex System Manager/ESA
- CICSPlex System Manager/ESA (CPSM)—provides total CICSplex management, including workloads

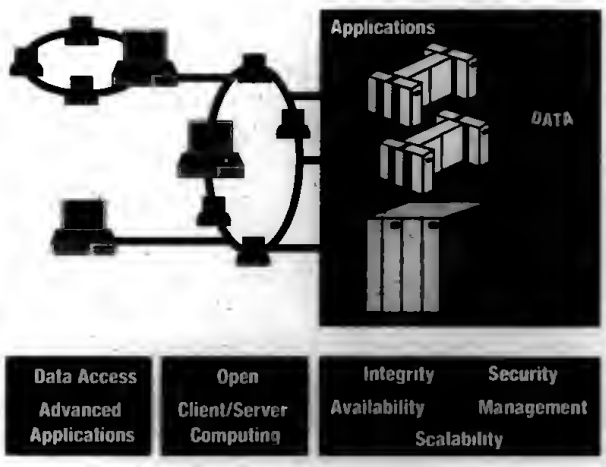
Why is this announcement significant?

In today's highly competitive business environment, IS departments are continually under pressure to provide *more* (availability and processing) with *less* (equipment, people, and funding). Open systems have provided cost-effective solutions for many functions central to the organization, including mission-critical applications and managing the corporate data resource. Businesses are growing more competitive, dynamic, global, diverse, and complex, becoming multiplatform, multivendor, multiprotocol, and distributed enterprises. Still, the end user must have reliable, continuously available, integrated, secured, and current data (Figure 3). IBM's parallel systems are designed to satisfy user demands for:

- Solutions more cost-effective than the existing System/390 architecture
- Continuous availability of business information
- Data accessibility regardless of user environment
- Investment protection for applications and equipment
- Robust systems management to assure fulfillment of service commitments
- Flexible growth, vertically or horizontally, as the business demands

IBM is attempting to provide a solution for supporting business growth while managing the growth of the IS infrastructure.

Figure 3
Today's Business Environment



What impact will parallel processors have on business?

IBM's parallel technology provides IS executives with advantages they have been begging for. The business benefits users will realize from parallel technology include potentially lower costs, higher system availability, improved response time, increased throughput, and system scalability. They will have near fault-tolerant MVS capability, something previously achievable only with self-contained hardware/software solutions. The potential price/performance and raw performance benefits of parallel systems will readily appeal to several data-intensive industries, such as financial services and insurance. Many are companies already

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on the leading edge of technology and are eagerly seeking that competitive edge, such as Allstate Insurance Company, (Northbrook, IL), the development site for the PTS.

Cost-effectiveness The PQS and PTS cost approximately one-half what their ES/9000 countetparts cost. Although official pticing has not been made available, IDC believes the hardware prices for the PQS and PTS will tange from $900,000 (50 MIPS) to $3,600,000 (200 MIPS). Bundled packages including software, storage units, and installation are expected to range from $1,750,000 (50 MIPS) to $7,000,000 (200 MIPS).

High Availability The parallel processor architecture provides the long-requested 24x7 MVS system availability. The enterprise information structure is distributed over multiple processors, systems, and subsystems. Processors can be dynamically added or removed from the enterprise system (and the resultant workload rebalanced) without affecting overall system availability. This is the essence of Sysplex.

Shared Data In the traditional MVS environment, data storage resources were assigned to a single system. In a parallel architecture, all data storage resources are shared and available to all parallel processors. In the oetworked, multivendor environment, MVS disk services manage data access for a large number of users.

Investment Protection IBM's parallel architecture is designed to protect the user's investment in equipment (connectivity to some 3090 and ES/9000 processors) aod business applications (minimal coding changes). Upgrades no longer require the disruption of processors being "fork-lift" replaced with vertical upgrades. Parallel systems can be expanded and can grow horizontally and dynamically with minimal disruption (just as storage is increased today). This can reduce costs of mainframe upgrades required to add System/390 "ECL" MIPS.

Systems Management The MVS operating system retains its inherent integrity including access to high-speed devices, large-scale data management capabilities, stringent security, managing large numbers of users, and sharing of system resources. Additionally, MVS provides an integrated set of open system services, including data access and exchange in a multiplatfotm environment. Today's enterprise has become less mainframe-centric. Organizations are restructuring their IT infrastructure with combinations of large processors, minicomputers, workstations, LANs, and personal computers. MVS is designed to interoperate with other DCE-compliant systems. Not only has CICS been ported to the entire family of IBM processors, but it will run on Hewlett-Packard's HP 9000, Digital's AXP, Microsoft NT, Novell's NetWare, and Apple's Macintosh.

Scalability No longer must capacity planners gaze into their crystal balls and "guestimate" how much computing power will be required through the year 1995, let alone how much their organization can afford. The modular architectures of the PQS and PTS enable an organization to match its processing power incrementally with its core business requirements. The scalability of parallel processors allows users to build and manage their computing power in gradual increments.

Migratioo CICS/ESA Version 4 Release 1 takes full advantage of IBM's parallel technology, providing improved availability with application isolation, Sysplex capabilities, and a new openness for CICS. CICS Transaction Affinities Utility helps users establish systems management functions by identifying transaction dependencies and using them as input to CPSM.

What are the challenges of managing parallel systems?

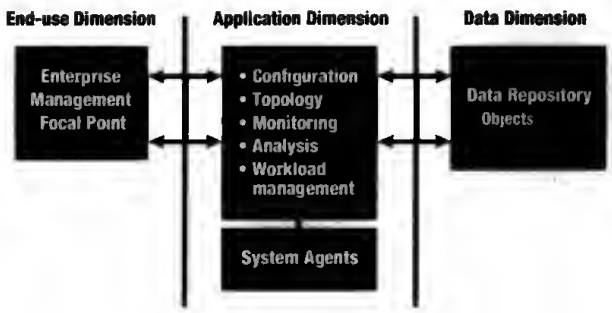
Does this all sound too good to be true? It is. IBM's parallel processing has a price, not in terms of dollars, but in terms of systems management headaches. Most of today's systems management solutions are not designed to support the parallel processing of IBM's new servers. In one sense, these parallel features are the advantages, but they also represent difficulties in systems management by their very existence.

Growth as a single system image In the new parallel architecture, CPU cycles are increased horizontally by adding another processor. Yet, the enterprise system will need to be viewed as a single system image with a single poiot of control. It will be impossible to individually optimize the tens or even hundreds of MVSs that will be running. Older system management products monitor activity from each of the subsystems and the system as a whole. Now they must monitor and manage workloads that may be running independently and may span many MVSs and CICSs, yet contributing as a whole. This is IBM's Sysplex.

Dynamic Scalability The ability to add or remove processors from the system without having to reconfigure or even interrupt the entire system is a data center manager's dream. But how is dynamic scalability defioed in systems management products? The ability to manage a dynamic scalable system as a single image is beyond the scope of many current systems management tools. It is difficult enough to manage multiple MVS systems on multiple processors. Complicate this even further by monitoring multiple subsystems (CICS, VTAM, databases) and the data center manager's dream quickly becomes a nightmare.

Workload Management and Balancing CICS transactions are no longer limited to one CICS region or eveo to one processor. Work is automatically routed to the optimal region. Data can be retained in that region for use by a subsequent transaction. Having cloned CICS regions, a workload can be dynamically balanced actoss those CICS regions. When a processor is added or removed, the workload is dynamically and automatically balanced. Older CICS management utilities can manage only one CICS region at a time and have no understanding of this dynamic environment.

Figure 4
Underlying Enterprise Systems Management Architecture



Data Model Parallel systems pose a more complicated problem of collecting systems management data, compiling it into a single image, and transporting or making it available to the systems management tools. This is difficult enough over a uni- or multiprocessor system with multiple subsystems. But, take this same environment with multiple MVS systems running on multiple parallel processors, each having multiple CICS regions, and the problem escalates exponentially.

Systems management solutions need to be examined carefully

Today's systems management solutions are designed for single-threaded applications. Today's performance management products, for example, typically run on single MVS images and have data gathering application and user interfaces combined in a single image. With multiprocessor regions, these can be gathered at the user interface level for cosmetic integration. This design is ioadequate when the number of managed objects exceeds about six. Multiple MVS operating systems, subsystems, and databases distributed over multiple processors, all working in unisoo on the same workload, must be managed. What solution today can support an enterprise consisting of 30 parallel processors, 30 MVS operating environments, and hundreds of CICS regions? Not many.

Parallel systems require a completely new set of utilities to manage the systems management data model for data collection, data transport, data compilation, and data analysis of systems management information. Finally, this systems management information must be presented rapidly, accurately, and in an easy-to-use interface with the controlling IS user.

As the enterprise information structure grows increasingly complex and diverse, so do the requirements for its management. IBM realized it cannot do this alone. As with SystemView, IBM has formed alliances with several crit independent software vendors, suc Boole & Babbage, Candle, Oracle, Ioformation Builders, to help pro supporting parallel systems managen software.

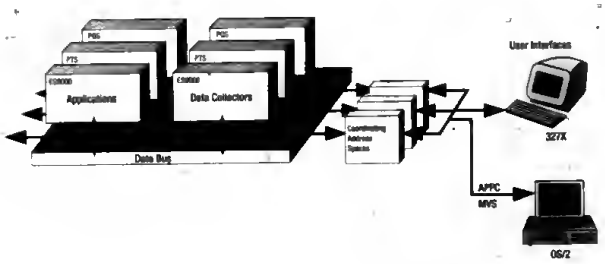
What is required for systems management solutions?

Systems management of par systems brings with it new concepts requirements for managing the en prise. The concept of managing processor or one CICS region is pa Systems management software cen around several key points crucial to success of parallel processing:

- Single system image
- Single point of control
- Support of dynamic updates to subsystems
- Support of dynamic scalability v the recognition of added or removed processors
- Assurance of high system availab
- Monitoring of workload manag ment and balancing across multi processors, multiple MVS opera systems, and multiple subsystem
- Interoperability with other heter geneous environments
- Taking advantage of the porenti cost benefit of parallel systems
- Proven architecture vs. great des with no implementations

In order for a systems managen solution to satisfy the above point must be designed with an architectur cut across subsystems, operating envi ments, and processors that may be f different vendors. This can be acc plished with a data model architec that provides separate, insulated la the user (operator), the application tems management utility), and (monitor and collector). This mod the essence of client/server systems n agemenr designed for integra

Figure 5
Parallel Systems Management Architecture



multisystem management solutions. Each of these insulated layers must be interconnected by an open communication bus, allowing the free generating, monitoring, and extracting of systems management data (Figure 4). The data model must combine and integrate the management information and present it in a concise and easy-to-use format.

IBM's Hursley Labs (Hursley, UK) has been working with Boole & Babbage (San Jose, CA) since 1989 to design and develop the system management software required to support the CICSplex and the introduction of IBM's parallel technology. The integration of systems management information from multiple systems and multiple subsystems requires an open underlying communications architecture (Figure 5). The first two available (or announced) systems management components designed to support this parallel technology are:

- **Boole & Babbage Intercommunication Facility** (BBI-3), the underlying facility of the MainView product line for collecting and transporting systems information from different enterprise subsystems and/or processors. BBI-3 has been marketed and supported by Boole & Babbage for more than three years and has over 1,000 installations including IBM's Hursley Lab.
- **IBM CICSPlex System Manager/ESA (CPSM)**, a product co-developed with Boole & Babbage to manage the CICSplex environment of CICS images spanning multiple regions on multiple processors using the BBI-3 architecture. CPSM (announced February 2, 1994 and available April 1, 1994) is marketed and supported by IBM.

Future enhancements that will affect systems management

The PQS initially supports read-only DB2 queries. Future models will support DB2 updates and Distributed Relational Data Architecture (DRDA) and will run in a standalone environment.

The PTS is designed to support IMS and service the current CICS market which makes up approximately 95% of the large IBM sites. Future enhancements will include support for DB2. Additionally, IBM is planning further enhancements to CICS to fully take advantage of the parallel architecture. In the near term, CICS will be enhanced to provide:

- VSAM file data sharing between CICS regions with record-level sharing between multiple CICS systems in the same or different MVS images
- Support for the Open Network Computing Remote Procedure Call (ONC RPC), the interface for client/server communication over Transmission Control Protocol/Internet Protocol (TCP/IP) networks

IDC analysis and recommendations

The IS infrastructure will become increasingly complex in structure and its processing more difficult to manage. IDC has carefully analyzed the available information for IBM's PQS and PTS and developed several recommendations to help vendors and IS organizations plan for and prepare to get the most out of the IBM parallel architecture (Figure 6).

1. The list of parallel systems management requirements above provides a starting checklist for measuring the breadth and depth of systems management solutions. Although many of them are also required in today's environment, these functions are much more difficult to provide in a parallel environment. Additionally, new requirements add to the complexity. A single enterprise system image, dynamic addition or removal of resources such as processors, and multisystem workload management and balancing are new concepts that must be addressed in the parallel environment. **The single most important concept is single system image.**
2. True systems management support of parallel systems is more than components integrated at the user level. With the complexity of parallel processing, solutions must be

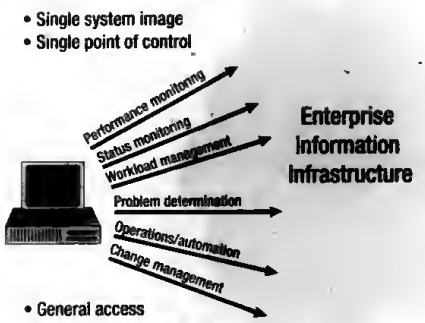
designed around an architecture of hundreds of MVS systems and hundreds of CICS regions, not the environment of today. **The proper underlying systems management architecture of parallel systems is critical.**

3. Since the operation of businesses continues on, vendors should provide utilities or services to **support the transition from current products and architectures to parallel technology.** CICS processing will be the first application to leverage parallel processing; since CICS transactions are more compatible with parallel processing, few modifications are required to leverage the parallel environment. Products designed to take advantage of parallel systems include IBM's CICS Transaction Affinities Utility MVS/ESA and CICSPlex System Manager/ESA and Boole's MainView products (which contain BBI-3). Batch processing requires more analysis and redesign to fully take advantage of parallel processing.

4. **Parallel systems require a new understanding of enterprise systems management.** Vendors must be well ahead of the demand curve for satisfying the requirements of the IS community. Likewise, IS users are going to be readily encouraged to remain with or move to those suppliers who provide enterprise solutions for the future and address concerns of parallel systems, such as performance.

5. Systems management products and providers must satisfy today's requirements, but be fully **committed to supporting the parallel architecture of the future.** With its parallel processing systems, IBM has already announced the availability of CICS 4.1 and its plans for new releases of MVS and DB2. We can also expect enhanced versions of other subsystems and supporting software such as JES, VTAM, TSO, and RACF.

Figure Six
Managing the Enterprise Information Architecture



As is so often the case, the hardware technology and capability is ahead of the software applications and utilities used to fully leverage the advantage. Could the announced systems management software for IBM's Parallel Systems be the exception? After twenty-five years of MVS experience, it appears solutions are available prior to IS managers experiencing the problems. Now, it is up to the software vendors to maintain that pace.

— Analyst
William A. Strapko
International Data Corporation

This previously unpublished White Paper is distributed by Boole & Babbage and was written independently by International Data Corporation.
This White paper is an executive summary of the IDC Research Report "Systems Management of the IBM Parallel Enterprise."
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CIVIC VIRTUES

IS AND MANUFACTURING STAFFS HAVE REACHED AN ACCORD AT A HONDA PLANT IN OHIO

By Ellis Booker

At many manufacturers, information systems groups and factory staff don't mesh well.

That was the case at Honda of America Manufacturing, Inc.'s Anna Engine Plant in Anna, Ohio. Tired of the standoffish relationship, both sides came together to tackle the problem.

Today representatives from the factory and the IS group meet weekly as a committee to hash out problems and set IS project timetables.

The committee's official name is the Computer Integration Vision Information Committee. But to Honda employees it's known by its acronym: CIVIC. Its goal is to open better lines of communication between IS and other departments throughout the plant.

CIVIC virtues, *page 82*

HONDA EXECUTIVES *(left to right) Dana Mee, Mike Wallace, Thomas P. English and David Hursh: IS/user group group prioritizes IS projects, sets ground rules*

CIVIC virtues

CONTINUED FROM PAGE 81

Now IS and the manufacturing staff are able to agree on priorities, and the entire plant is better informed on the status of IS projects.

"It gives me a high degree of comfort," says Susan Insley, senior vice president and manager of the Anna plant, "to know that several groups have reviewed IS budget requests — including the departments themselves and CIVIC."

Filling in the customer

Plant representatives say the committee, by giving them direct access to IS, provides a look at the plant's entire IS needs and an appreciation for how other departments demand attention from IS.

"One of the very big successes [of CIVIC] is you can articulate to your customers why their project isn't being done," says Thomas P. English, a staff engineer in the environmental health and safety group and an original member of CIVIC.

The Anna Engine Plant's experience with CIVIC has been such a success that Honda is rolling out the CIVIC approach to its three other North American plants.

The next phase, which is being implemented this year, will be a "committee of committees." Each plant will have a committee and one representative from each of these will serve on the meta committee.

CIVIC is also being used to help prototype new software. CIVIC members or people from their respective departments are now volunteering to beta-test software. In addition, CIVIC meetings include discussions of long-term strategies for IS, such as whether or not to move from DOS to OS/2.

Additional meetings are held for emergencies and during the annual budgeting process.

"It gives me a high degree of comfort," says Susan Instey, senior vice president and manager of the Anna plant, "to know that several groups have reviewed budget requests — including the departments themselves and CIVIC."

First meeting

The creation of a joint committee composed of IS and factory representatives was proposed two years ago by two IS managers: David Hursh, who at the time was responsible for IS at the Anna plant, and his successor, Mike Wallace, who was then manager of the support service group at the Anna plant. IS is responsible for manufacturing automation and administrative systems at the plants.

Attending the first monthly meeting in October 1991 were representatives from IS and five groups from the factory: engine, suspension, quality service, support service and plant service. Management of the five groups had appointed the representatives and were involved in departmental business planning.

"IS wanted some way to prioritize projects and have two-way communication" with the factory, says Hursh, now manager of the 167-person information services department at Honda's corporate office.

Manufacturing, meanwhile, was pushing IS for better turnaround on projects and a sense of IS strategic directions

"We wanted to get input into the decision-making cycle," English says.

Prioritizing

The 5,000-person Anna Engine Plant produces 500,000 engines and related parts annually. A massive facility, it combines several different kinds of plants under one roof. Between its 690,000 sq. ft. Engine Group and 415,000 sq. ft. Suspension Group, Anna does everything from aluminum casting in a foundry to steel machining and parts assembly.

Dana Mee, manager of the suspension group quality control, says one of the most difficult tasks undertaken by CIVIC was devising a way to rank projects in some quantifiable way.

"We look at the different effects of a project, such as its impact on a department in the plant," Mee says.

Other aspects measured include cost savings through better use of staff or more efficient production, or the project's effect on safety or quality.

To date, CIVIC's decisions have been made through consensus although representatives acknowledge there has been some hagging over the project ranking numbers.

Small projects that don't impact the business plan go through CIVIC alone; with larger projects, CIVIC makes a recommendation to plant management, which examines both the recommendation and the CIVIC justification.

An ancillary benefit of CIVIC is that some IS projects are deemed redundant or trivial when the plans of another part of the factory are considered.

No squeaky wheels

In the past, English observes, IS seemed to allocate its resources based on the "squeaky wheel" — the department that yelled for its project the loudest. But he thinks the level playing field imposed by the committee structure has been better for the plant as a whole.

Besides, individual factory departments now know the ground rules and "that there is an organized method on how to get a project approved." Unless they can justify a benefit, they will not get the project.

Hursh acknowledges that before CIVIC, plant customers often communicated "one-on-one" with the IS project manager or even with individual programmers.

Hursh also contends that the "squeaky wheel" effect happened only on noncritical and smaller projects, not ones mandated and expected by top management.

With the CIVIC process, Hursh's department can now allocate its resources appropriately and feel confident that it is synchronized with the needs of plant customers. This prevents a mismatch between what IS thinks is important and what others think is important.

The tangible benefit for IS is that it can quantify budgetary needs going forward, which allowed IS to add positions in the 1993 budget. ■

Booker is *Computerworld*'s Midwest senior editor

PRIORITIZING BY THE NUMBERS

Honda's CIVIC committee has a four-part weighting system to prioritize new IS projects. The projects are numerically scored for how well they meet each item:

1. PLANT GOALS: The project is rated for safety, quality, production, business, cost and other factors. (These are called theme points, and they give the project a numerical value.)

2. HONDA GOALS: Each project is rated according to company objectives for a specific business plan, such as environmental control.

3. PAYBACK PERIOD: An additional rank is given on the basis of payback period — the shorter the payback, the higher the value given.

4. IS GOALS: These include internal IS concerns such as the ability to easily modify existing systems, data accuracy, etc.

IS projects score the most points for helping to attain plant goals. Honda goals and payback period are given fewer points; meeting IS goals receives the fewest.

AT A GLANCE

HONDA'S ANNA ENGINE PLANT

Engines produced annually	500,000
Suspension Group plant size	415,000 SQ. FT.

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Curing the cubbyhole blues

MasterCard credits its "university" for making its St. Louis IS operations and other back-office departments better bottom-line contributors. It also gives employees the ability to hop functional fences.

By Alan R. Earls

Kevin Phalen was regarded as a star in his old job as director of field operations at MasterCard International, Inc. His boss, Kristine K. Crow, senior vice president for member relations/Midwest, gives Phalen high marks for his technical expertise and ability to help specify and negotiate system features between the information systems group and end users.

Although still regarded as a star, Phalen now holds a different job: account executive for member relations.

He uses his IS background, as well as a host of new skills in marketing and management, to help bring more business to this St. Louis-based payment services company from its membership of 24,764 banks and other financial institutions worldwide.

Phalen credits his successful career shift to both his abilities and a successful cross-training initiative.

"I wasn't really planning this originally," Phalen says, "but my boss said she needed me to see beyond a purely operations focus. She made it a personal challenge for me to acquire additional skills."

Comprehensive training

IS organizations need to train their staff members to understand the business, particularly if they want IS professionals like Phelan to serve as intermediaries between IS and the departments IS serves.

That's where the 3-year-old, companywide training program called "MasterCard University" enters the picture.

Susan Burke, vice president of the program, says MasterCard University is part of the company's overall effort to train employees to understand one another's jobs.

This training program is how the company helps IS professionals enhance their business skills, understand their business and industry and improve the use and distribution of information in general.

> "We want all our employees to be well-versed in their own jobs and in what we are trying to do as an organization."
>
> SUSAN BURKE, VICE PRESIDENT, MASTERCARD UNIVERSITY

Three-part process

"The key to the program is a three-level approach designed to cure the cubbyhole mentality," Burke says. "We want all our employees to be well-versed in their own jobs and in what we are trying to do as an organization."

Employees usually go through the first part of the program — orientation — within six months of being hired. That segment includes three full days of lectures and seminars designed to provide an overview of MasterCard.

"The program is very interactive and includes games, case studies and team activities," Burke says.

Part two provides a walk-through of departments such as marketing, sales and product development.

"They get to ask questions, see demonstrations and even listen in on telephone calls so they get a real feel for the front line," Burke says.

The third level, optional for most employees, is an in-house program called the Business of Bank Cards. A few employees who could benefit from even more training in this area are sent to a week-long program called the American Bank Card School, sponsored by the American Banker's Association.

An additional curriculum was designed for the needs of MasterCard's member banks, though Burke says employees sometimes take these courses if it would help them in their work.

Successful graduate

"Before this program I had been very myopic," Phalen says. But with additional training, he was given a chance to move out into field work, "supporting the MasterCard brands." There his knowledge of operations has proved to be a great asset in selling new products — many implemented with new technology — to new members.

That's the kind of flexibility MasterCard wants more of as it strives to grow in the bank card business.

"As an association of almost 25,000 financial institutions, it is possible any of us could have occasion to talk to a member organization at any time," Burke emphasizes. "What we don't want is people saying, 'Sorry, that's not my job.'"

On a broader scale, Burke argues that the program has helped revive and expand a sense of opportunity for Phalen and employees like him, "while also fitting in with our continuous improvement process."

Although Burke says the jury is still out on how much MasterCard University has benefited employees, feedback has been positive.

"We found there was a real gap, both internally and in member institutions, between what people knew and what they needed to know to deal with brand issues. [MasterCard University] helped bridge this gap, empowering people to contribute to help solve the problems," says Fred Gore, senior vice president of U.S. acceptance. Gore works with member institutions that accept card payments.

MASTERCARD UNIVERSITY *students enhance their business skills and are better prepared to work with end users*

Christopher Kampmeier, a MasterCard software engineer, also offers kudos for the program. Although Kampmeier has not switched careers, he does credit the university for broadening his perspective.

"The first direct benefit I got was learning about technical areas adjacent to my own," Kampmeier says.

An ongoing process

In addition, Kampmeier says the extensive handouts provided in the MasterCard overview have served as an ongoing reference for him, enabling him to continue learning on his own.

To ensure that the program is not a purely "top-down" initiative, the funding for MasterCard University comes from both a corporate budget and individual departments. Departments fund those courses specifically oriented toward them.

"It is an evolving process where we are always identifying new needs and developing an expanded curriculum," Burke says.

Now, with such extensive support, employees will no doubt be prepared to "master the moment," no matter what their role in the MasterCard organization. ■

Earls is a free-lance writer in Franklin, Mass.

TRAINING THE TECHNO-ILLITERATE

Susan Burke, vice president of MasterCard University at MasterCard International, vows that techno-illiteracy will soon be a thing of the past at MasterCard.

"We want our nontechnical people to be able to speak with confidence about MasterCard's technology too," she says.

Indeed, that has become the focus of a whole new training initiative. With more and more aspects of the bank card business being directly impacted by technology, there's no choice.

"Our 'Program Global' — an organization-wide move toward open architecture — has been the impetus," Burke says. "Many of our people don't understand where we were or where we are going technologically. Program Global will touch lots of different people on the member side, so we all have to be ready to discuss this knowledgeably."

Burke says a new course, called MasterCard Technology, will help people in sales and marketing get up to speed and become part of the Program Global changeover. It will also help them avoid embarrassing disconnects with co-workers or member organizations.

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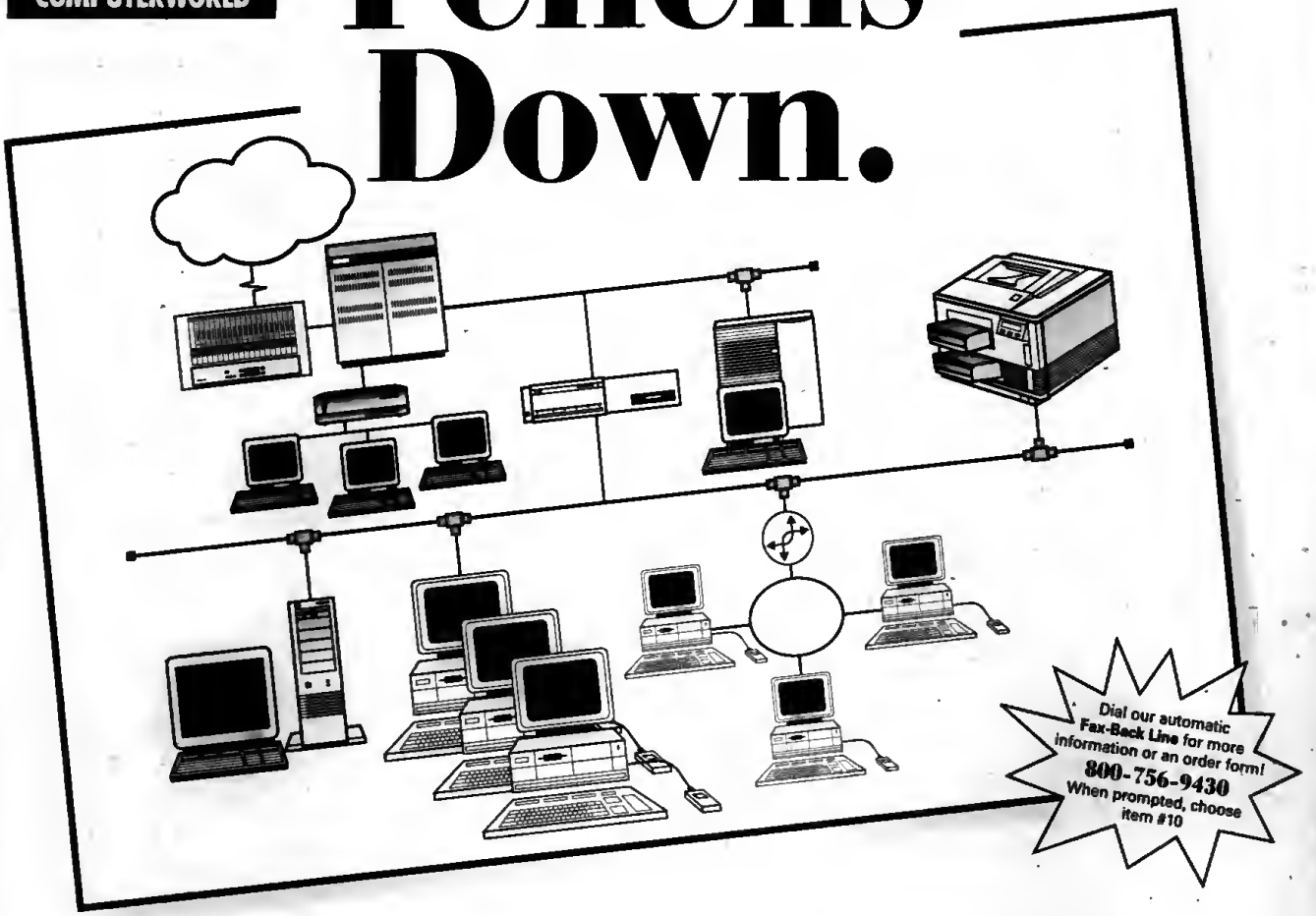

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Data views are ideal for those requiring immediate and direct access to the most current data. Views contain no actual data. Instead, they describe the data, its attributes, and location. Using views, you can give information seekers access to up-to-the-minute data-as you hold down costs (why maintain duplicate files?) and reduce your training and support burden (since every department shares the same path to data.)

If database performance is as big a concern as data security, **data extracts** are ideal. They, too, contain information about the data—as well as the physical data that comprises each record. Extracts make it easy to administer data requests without worrying about the performance impact of ill-timed or poorly constructed queries against your production databases. What's more, *you* control the frequency of refreshing the extracts.

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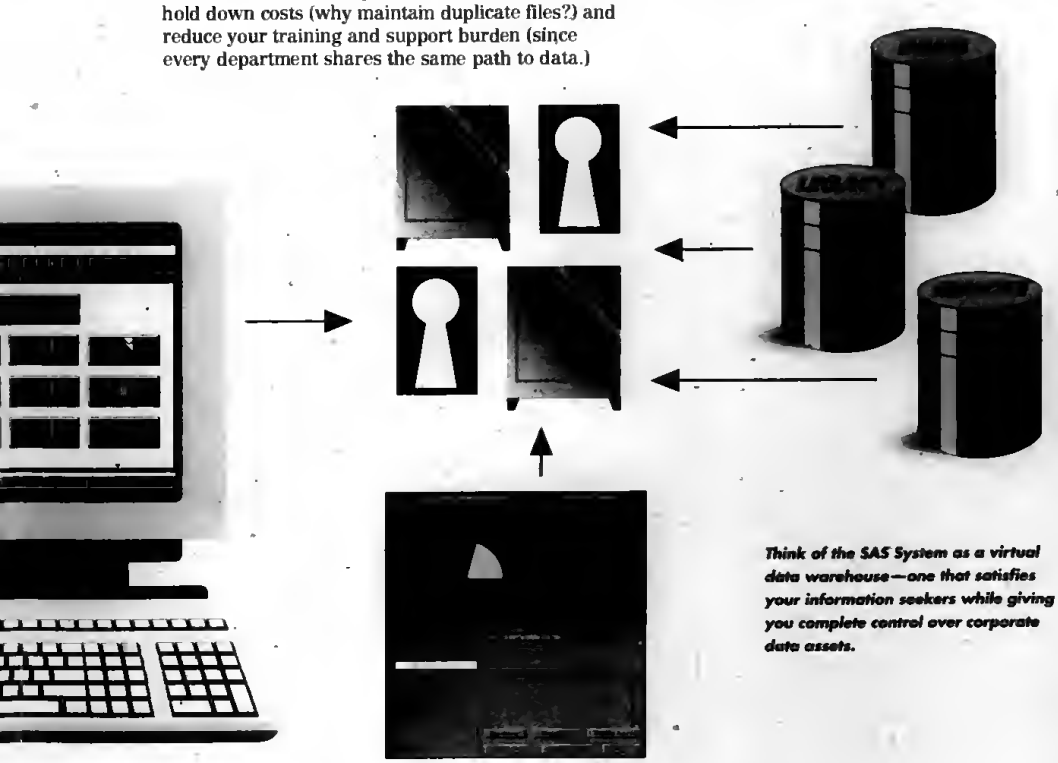

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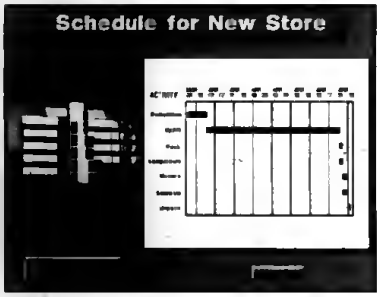

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Calendar

APRIL 17-23

SHARE Spring 1994 Meeting. St. Louis, April 17-20 — Contact: SHARE, Chicago, Ill. (312) 822-0932.

Accounting and Cost Allocation for Client/Server Systems. Toronto, April 18-20 — Contact: Technology Transfer Institute, Santa Monica, Calif. (310) 394-8305.

Distributed Computing World. Washington, April 18-21 — Focus: There will be four separate conferences designed for companies in the process of implementing distributed systems. Contact: Digital Consulting, Inc., Andover, Mass. (508) 470-3880.

Electronic Messaging '94. Anaheim, Calif., April 18-21 — Focus: E-mail. Contact: Electronic Mail Association, Alexandria, Va. (703) 524-5550.

ISCA '94: 21st International Symposium on Computer Architecture. Chicago, April 18-21 — Contact: Association for Computing Machinery, New York, N.Y. (212) 869-7440.

Unix Reseller Conference. Dallas, April 18-21 — Keynotes: Charles B. Wang, CEO of Computer Associates International, Inc., and Phillip E. White, CEO of Informix Software, Inc. Contact: Expoconsul International, Inc., Princeton, N.J. (609) 987-9400.

Distribution/Computer Expo '94 & Seminar '94. Rosemont, Ill., April 19-20 — Focus: Electronic data interchange, warehousing, transportation management, logistics, bar-code technology, distribution and industry trends. Contact: C. S. Report, Uwchland, Pa. (610) 458-6410.

Client/Server Developer's Conference. Washington, April 19-21 — Contact: Digital Consulting, Inc., Andover, Mass. (508) 470-3880.

Networks Expo. San Francisco, April 19-21 — Focus: Networking and computing. Contact: Annie Scully, Bruno Blenheim, Inc., Fort Lee, N.J. (201) 346-1400.

Re-engineering: The Implementation Perspective. Boston, April 19-21 — A seminar providing an introduction to the concepts and objectives of re-engineering with an analysis of the business factors driving it. Instructor: Michael Hammer of The Center for Re-engineering Leadership. Contact: Hammer and Co., Cambridge, Mass. (617) 354-5555.

The Third International Conference on Software Methods. Boston, April 19-21 — Theme: Keeping methods turned to technology. In addition to keynote talks, the conference features numerous two-track sessions, including Software Development with Agents, Effective Technology Transfer, Reusing Products of Analysis, Client/Server Rapid Application Development and Methods for More Usable Software. Sponsors: Technology Transfer Institute and The Atlantic Systems Guild. Contact: Technology Transfer Institute, Santa Monica, Calif. (310) 394-8305.

1994 Society for Information Management (SIM) Institutional Member Conference. Ponte Verdra, Fla., April 19-22 — Contact: SIM, Chicago, Ill. (312) 644-6610.

Seventh Annual Intermac Users Group Education Symposium. Toronto, April 20 — Focus: The three-day event will help users understand the world of bar-code data collection and how to apply practical solutions that will help improve productivity and reduce operating costs in any business. Contact: Kimberly Lombard, Intermac Corp., Everett, Wash. (206) 348-2600.

The First Internet Auction. Boston, April 22-29 — Contact: The Computer Museum, Boston, Mass. (617) 426-2800, ext. 341/329.

APRIL 24-30

Computer Human Interaction (CHI) '94: Association for Computing Machinery (ACM) Conference. Boston, April 24-28 — Focus: "Human Factors in Computer Systems." Contact: ACM, New York, N.Y. (212) 869-7440.

VIP '94. San Antonio, April 24-28 — Legent Corp.'s annual users' conference. Open to all users of Legent products; designed for managers and professionals at all levels. Contact: Legent Corp., Herndon, Va. (703) 708-3000.

The 24th Computer Audit, Control and Security. Dallas, April 24-29 — Contact: Sara S. Patterson, The EDP Auditors Association, Rolling Meadows, Ill. (708) 253-1545.

Investment and Finance Strategies for Small High-Tech Companies. New York, April 25 — Also in Boston on May 2, Raleigh-Durham, N.C., on May 9, Chicago on May 16 and San Jose, Calif., on May 23. Contact: Paula Ungureanu, International Association of Knowledge Engineers, Gaithersburg, Md. (301) 946-5390.

ServiceTrends '94. Boston, April 25-26 — The 11th Annual Conference for Senior Service Executives. Theme: "The Service Revolution: Your Key to the New Information Technology Industry." Featured speakers: Jim Champy, president of CSC Consulting Group, will offer a "view from the top," sharing his insight and expertise in positioning and marketing value-added services; James Manzi, president and CEO of Lotus Development Corp., will discuss topics ranging from the importance of services to the technology solutions Lotus offers customers. Contact: Dataquest, Inc., Framingham, Mass. (800) 457-8233.

First Annual Conference on Mass Customization. Dallas, April 25-27 — Keynotes: Stan Davis, author of *Future Perfect*; and Joseph Pine, author of *Mass Customization: The New Frontier in Business Competition*. Contact: Management Roundtable, Boston, Mass. (617) 232-8080.

Patricia Seybold's 1994 Technology Forum. Cambridge, Mass., April 25-27 — Focus: Designing enterprise client/server applications using distributed objects. Contact: Patricia Seybold Group, Boston, Mass. (617) 742-5200.

Out of this world team building

Project managers who want to learn how to build strong, effective teams can learn from those who have done so under the most challenging conditions — U.S. astronauts.

Astronaut training is the model for a three-day corporate team building program being hosted at the NASA Visitor's Center/U.S. Space & Rocket Center in Huntsville, Ala., from April 15-17. Called "How to Build an Astronaut Caliber Project Management Team," the program uses space shuttle equipment and team-building exercises similar to those used in actual astronaut mission training.

Hosted by the International Institute for Learning, Inc. in New York, the program will take 16 project leaders and members of project management teams through a series of NASA-designed simulated orbital flight missions. Assigned to a variety of actual space mission roles, the participants must act as a team to deal with such crises as meteor storms, main engine failures, oxygen depressurization and blown landing tires. In all cases, the results of their actions could mean life or death for team members.

Leading the training program will be Harold Kerzner, a project management expert, and Lisa Renchik, a project management consultant. The program will also feature the participation of at least one NASA astronaut.

Additional program dates have not been announced, but the program can be customized toward the need of specific companies and for any kind of team. For more information, call Amy Nichols at the International Institute for Learning at (800) 325-1533.

Executive Track

Teleport Communications Group, a Staten Island, N.Y., provider of local telecommunications services, has announced the appointment of **Marvin L. Lindsey** to the position of senior vice president of engineering and MIS.

Lindsey will be responsible for overseeing the company's ongoing and long-term technical development strategy. This responsibility includes network and service engineering, technology research, development and implementation and information systems functions, including software and hardware selection and maintenance.

Prior to joining Teleport Communications Group, Lindsey was vice president of business communications services at AT&T where he was responsible for the design, delivery and maintenance of switched and dedicated network services for business customers in 13 western states.

Protection Mutual Insurance Co. in Park Ridge, Ill., has announced the appointment of **Gregory G. Blum**, 45, as assistant vice president of IS. Blum has been working at the Computer/Office Systems Operations Division at Protection Mutual since 1985.

Cambridge Resource Group, Inc. in Cambridge, Mass., has announced the appointment of **Phyllis Dunn** as chief operating officer and director of technology. She reports to Cambridge Resource Group President Bob Miller.

Prior to joining the company, Dunn was division director of information technology and administration at the Massachusetts Water Resources Authority in Boston.

She has also held positions at Prime Computer, Inc., Lotus Development Corp., Wang Laboratories, Inc. and Digital Equipment Corp.

The Port Authority of New York & New Jersey has announced the appointment of **Karen Antion** as director of IS. Prior to joining the Port Authority, she was director of MIS for the city of Hartford, Conn. She was previously director of IS at the Society for Savings.

Allendale Insurance Co. in Johnston, R.I., has announced the election of **Darrell R. May** as senior vice president of information services.

He reports to Shivan S. Subramaniam, who is president and chief executive officer.

May joined Allendale in 1974 as manager of operations analysis. Two years later, he was promoted to manager of business systems research and development and assistant vice president. In 1978, he assumed his current responsibilities as vice president of information services.

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Bellevue, WA	6/09	Oklahoma City, OK	4/12
Birmingham, AL	5/04	Orlando, FL	4/07
Boca Raton, FL	4/12	Ottawa, ON	4/20
Boston, MA	4/12	Portland, OR	5/10
Boulder, CO	5/18	Richland, WA	5/24
Charlotte, NC	4/21	Sacramento, CA	6/01
Cincinnati, OH	4/13	Salt Lake City, UT	4/20
Cleveland, OH	4/26	Secaucus, NJ	4/07
Colorado Springs, CO	5/11	Springfield, MO	5/18
Columbus, OH	4/26	St. Louis, MO	4/28
Des Moines, IA	4/26	Stamford, CT	5/06
Detroit, MI	5/10	Tacoma, WA	6/15
East Lansing, MI	5/24	Tallahassee, FL	5/12
El Paso, TX	4/07	Tampa, FL	5/05
Halifax, NS	4/14	Toronto, ON	5/05
Hartford, CT	4/12	Tulsa, OK	4/13
Honolulu, HI	5/03	Wichita, KS	4/13
Indianapolis, IN	5/18		
Iselin, NJ	5/10		
Kansas City, KS	5/19		
La Jolla, CA	4/27		
Las Vegas, NV	5/03		
Little Rock, AR	5/12		
Long Beach, CA	4/12		
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MAKING THE STRATEGIC CHOICE

Unix VS. NT VS. OS/2

SCALABILITY	7.5
INTEROPERABILITY	6.4

(Based on a 1-to-10 scale where 10 is best, 50 Solaris users)

SCALABILITY	6.3
INTEROPERABILITY	6.3

(Based on a 1-to-10 scale where 10 is best, 50 NT users)

SCALABILITY	6.3
INTEROPERABILITY	5.7

(Based on a 1-to-10 scale where 10 is best, 50 OS/2 users)

Scalability, or the ability to run in a wide range of performance and configuration requirements, and interoperability, or the ability to run across multiple vendors' systems, are the key features that differentiate client/server operating systems for information systems organizations trying to select strategic platforms.

It will be these characteristics more than any others that determine whether Microsoft Corp.'s Windows NT, IBM's OS/2 or one of the flavors of Unix from SunSoft, Inc., Novell, Inc. or another vendor will dominate the long-term operating systems market.

So far, based on delivered products, Unix is clearly in the lead. With recent moves to shore up its multiple versions [CW, March 21] and the high ratings accorded by users of SunSoft's Solaris and Novell's UnixWare in our Buyers' Satisfaction Scorecard, the Unix environment is the one to beat.

But NT and OS/2 should not be counted out. The versions of Unix currently available for the desktop are fairly new and still working out the bugs, just as NT is gradually passing through its early immaturity. OS/2 has the advantage of stability, and IBM is playing multiple strategic hands hoping the outcome of efforts such as Taligent, Inc. will place OS/2 in a more prominent position.

Meanwhile, many a client/server installation is running with Novell's NetWare as the server for Windows 3.1 clients. Used as benchmarks for our survey, this set of products has the clear advantage of being a workable solution for today. Users do not have to wait for the strategies or bugs to get ironed out.

However, user ratings and technical analysis of this approach show some clear weaknesses for the NetWare/Windows combination. The bottom line? These products were not designed for the heavy-duty platform most IS organizations need.

This report explores the relative capabilities of these products in detail. By providing a realistic assessment of where these products stand today and taking a hard look at future possibilities, we hope to cut through the hype and make your decision about which operating environment is best for your organization a bit easier. ■

Inside

▶ Buyers' Satisfaction Scorecard: Top 6 operating systems reviewed. PAGE 94

▶ NT, OS/2 and Unix strengths and weaknesses analyzed. PAGE 96

▶ Firing Line: Solaris 2.3, the most reliable version. PAGE 106

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Users rate operating systems on delivered features; Solaris, NetWare garner top scores

BUYERS' SATISFACTION SCORECARD: Users rate Windows highest in ease of use, but NetWare and Unix get top reliability marks

	Microsoft's WINDOWS NT	IBM's OS/2 2.1	UNIX: SunSoft's SOLARIS 2.2	UNIX: Novell's UNIXWARE 1.1	BENCHMARKS: Microsoft's WINDOWS 3.1	BENCHMARKS: Novell's NETWARE
	NT suffers from reliability and technical support problems but shines in ease of use and performance	OS/2 struggles with inter-operability and scalability outside IBM platforms but rates high in performance.	Solaris tops scalability, performance and inter operability ratings, but reliability and ease of use rate lower	UnixWare's technical support ratings are below its competitors. Scalability and performance are strengths.	The predominant client platform, Windows 3.1 has high usability and technical support, but it can't match 32-bit systems in other categories.	NetWare is the dominant server platform, and it leads in reliability, but it is not a true applications server.
OVERALL SCORE	[illegible]	64	65	64	59	66
EASE OF USE	7.0	6.7	6.2	6.2	7.3	5.5
PERFORMANCE	6.7	7.0	7.2	6.9	5.5	6.7
RELIABILITY	5.9	6.2	6.2	6.5	5.4	7.0
SCALABILITY	6.3	6.3	7.5	6.6	5.8	7.0
INTEROPERABILITY	6.3	5.7	6.4	6.1	5.8	6.3
TECHNICAL SUPPORT	6.1	6.4	6.2	5.9	6.5	6.5

By Michael L. Sullivan-Trainor and Jonathan Eunice

While many information systems organizations are still debating which client/server operating environment will be their strategic system for the future, a large number of companies have already decided in favor of one of the three major alternatives — Windows NT, OS/2 or Unix.

Our Buyers' Satisfaction Scorecard survey asked large numbers of these users how the marketing hype matches the features and functions delivered by the vendors. Their answers, reflected both in the table on this page and in charts throughout the section, indicate that none of the systems are without significant weaknesses.

- Users found NT to have limits in reliability, rating it low in integrated security features (4.9) and built-in fault tolerance (5.8).
- OS/2 users gave it the lowest interoperability rating (5.7). The product also received relatively low ratings in security (5.6) and integrated systems and network management (5.7).
- Solaris' lowest ratings came in the areas of built-in fault tolerance (5.2) and ease of installation (6.0).
- UnixWare users rated technical support (5.9) for the product lowest among the systems surveyed and also gave it low fault-tolerance numbers (5.7).

These ratings are based on a 1-to-10 scale, where 1 indicates the product performs very poorly in the category and 10 represents high performance.

Six major categories were considered in the survey, with two or more subcategories for each area such as ease of use (which includes ease of installation and usability of the graphical user interface) and reliability (which includes security, fault tolerance, systems management and integrity). Detailed ratings for each subcategory are on the following pages.

The survey was performed by First Market Research Corp. in Austin, Texas, via telephone calls to more than 400 operating system users supplied by *Computerworld*'s Database Division.

A minimum of 50 respondents were counted in the ratings for all products except UnixWare, where the minimum was reduced to 30 because of the newness of the offering.

Users operated the systems in a variety of client and server modes, and ratings reflect the average satisfaction with the products in both environments.

Windows 3.1 and Novell's NetWare were included for comparison purposes. A minimum of 100 users of those systems were counted in the ratings.

REAL-WORLD BENCHMARKS

Although the future of client/server operating environments lies with development efforts around NT, OS/2 and Unix systems, the most prevalent and popular client/server combination today is Windows 3.1 on the desktop and NetWare 3.x on the server.

This one-two punch has the strength of bountiful application availability and an ample cadre of skilled IS personnel familiar with the products. This split architecture also works well from a technical perspective because it allows considerable tuning of the client and server systems for their respective tasks.

The value of such tuning is shown, for example, by the scalability (7.0) and responsiveness NetWare achieves — close to the same league as Unix (Solaris, 7.5) and well ahead of NT and OS/2 (6.3), according to the Scorecard user ratings.

At the same time, the split imposes a support burden. IS staffers must learn and operate DOS, Windows and NetWare and understand the subtle incompatibilities among them — which is partly reflected in NetWare's low (5.5) ease-of-use rating. This management burden can grow to consume 50% of the total cost of ownership, erecting a barrier to good return on investment.

Most important operating system categories

1. Multitasking
2. Usability of GUI
3. Scalability
4. Interoperability
5. System integrity
6. Compatibility with installed systems
7. Integrated system and network management
8. Security
9. Ease of installation
10. Technical support

Based on 400 users surveyed in Buyers' Satisfaction Scorecard

On the other hand, an integrated client/server environment has lower training, systems management and software development costs because only one environment must be learned and operated.

There is also more flexibility because the dual nature of each node in the network allows many systems to offer services.

In fact, full client/server networks are not easily distinguishable from full peer-to-peer networks, except that they are typically configured differently. The downside of integration is the set of compromises that must be made to satisfy the often divergent requirements of client and server systems.

More than one Unix

Although Unix vendors are once again talking about unity [CW, March 30], there are a number of competitors in the client/server operating environment sweepstakes. In addition to SunSoft's Solaris and Novell's UnixWare, profiled in the table, two popular contenders are The Santa Cruz Operation's SCO Unix and Next Computer, Inc.'s NextStep.

SCO Unix, featuring Open Desktop, is one of the most widely installed Unix systems on Intel Corp.-based PCs. But the system's primary use has been as a "little minicomputer," replacing the traditional departmental system/dumb terminal arrangement of the proprietary minicomputers. SCO is in the throes of trying to reposition the product as a client/server competitor capable of matching the positioning of Solaris and UnixWare.

Next's efforts include OpenStep, a version of NextStep for non-Next platforms. Next's primary focus is as a custom application development environment that works best on Next hardware.

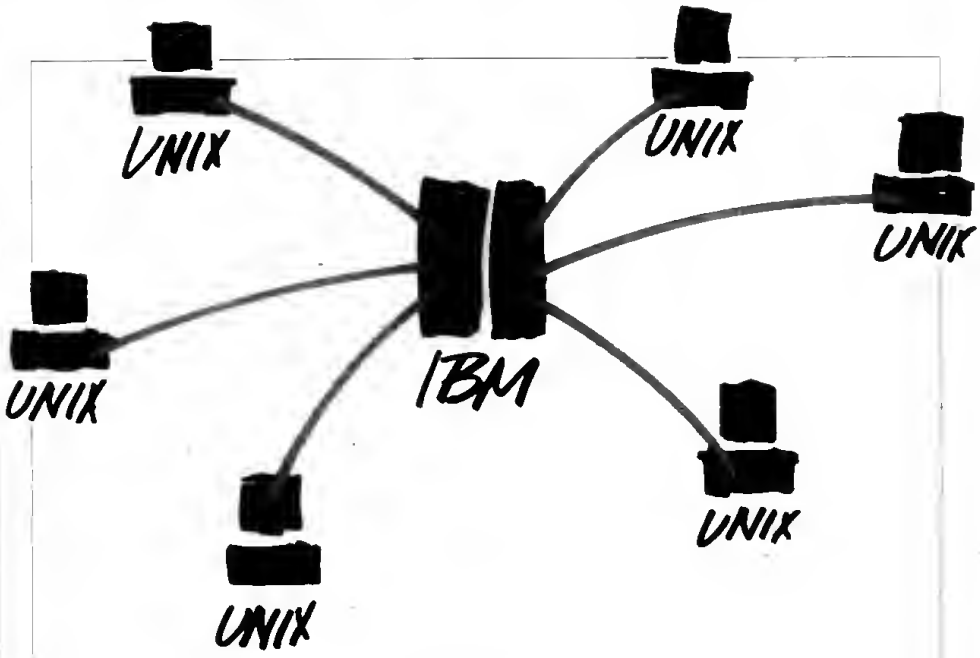
However, recent alliances with Sun Microsystems, Inc., Hewlett-Packard Co. and other Unix vendors indicate the company's desire to widen the system's usage.

Methodology

To calculate overall scores for the six operating systems rated in this Buyers' Satisfaction Scorecard, the average rating for each measured category was multiplied by the average importance rating users assigned to that category. The overall score for each product is the average of all the weighted user ratings for that product.

Each user group rated its own product independent of the other products. Users were not asked to make any direct product comparisons. Tabulation was performed by First Market Research. *Computerworld* analyzed the data and interpreted the results. ■

Sullivan-Trainor is *Computerworld*'s senior editor, CW Guide. Eunice is research director at Illuminata, a Hollis, N.H., computer technology assessment company that specializes in systems architecture, software and management issues.



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- Do you process interactively (3270 5250), in batch (RJE), or both?
- Do you use program interfaces such as HLLAPI, CPI-C/APPC/LU6.2, and LUA/LU0?
- How do you manage your network? How do you distribute programs, files, and data to your remote UNIX systems?
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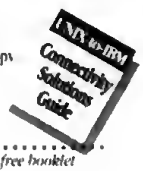

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Windows NT: Still an unfulfilled promise

NT may eventually become a credible, though not dominant, player

By Jonathan Eunice

Like Unix, Microsoft's Windows NT promises a quality client/server environment that scales from desktops to large servers, is portable across a range of platform architectures and provides a solid base for developing and deploying applications.

Unlike Unix, NT promises all this without the pitfalls and uncertainty of dealing with multiple versions from competing vendors or standards groups.

Portability without the pain

On the technical side, NT is poised to deliver much of what it promises. Although initial versions are immature, incomplete and far too resource-hungry, it seems likely these glitches will be fixed over time. As that happens, NT's strengths will increasingly come into play.

For example, NT has fewer holes in the fabric of its cross-platform portability than does Unix. While different vendors' Unix systems have different application programming interfaces, utilities, user interfaces and other aspects, there is only one NT. To address multiple platforms, a developer need craft only one program.

Although this may somewhat overstate NT's portability advantage — because much of the cost of selling software for multiple Unix versions resides in quality assurance and documentation issues, rather than programming — it comes closer to the truth than does "the myth of the single Unix."

Unrealistic expectations

While NT has potential, Microsoft's marketing corps essentially made the same set of promises about open systems benefits that were unfulfilled by Unix. Users and independent software vendors are susceptible to the idea of just one all-singing, all-dancing environment that meets most of their technical needs, works on most hardware and provides the latest and greatest function. Microsoft's enormous success with DOS and Windows made this renewed promise all the more believable. Well, at least initially more believable.

NT has also been touted as a technical triumph. Its virtuoso designer, David Cutler, previously architected one of the best operating systems extant: Digital Equipment Corp.'s VMS. NT supposedly represents his genius applied to desktop systems. To this has been added the unspecified promises of object-oriented technology in a future Cairo release.

Of course, most of this is hokum. While a modern design and a sound product, NT contains no unique or particularly advantageous technologies not found in OS/2 and the best of Unix. And while Cairo may eventually deliver object-driven benefits, any such fuzzy and undelivered future must be recognized as far better optimized for the marketing presentation than for helping users today. The real advantages of this "VMS for the desktop" relate not to its technical supremacy but rather to the supremacy of Microsoft's industry position and business acumen.

The proof is simple: If the tables were turned so that instead of NT, Microsoft had today's OS/2 or Unix to sell, it seems highly likely that the folks in Redmond, Wash., would be no less successful.

Unified development model

Equally important or more important than NT's technology and cross-platform portability is Microsoft's unified business model. Indeed, if NT is ultimately successful, it will not happen because it is better than Unix but because Microsoft's development process is better.

"Better" may seem a weighted term, but market success — or lack thereof — gives an unambiguous frame of reference. A single, resourceful company such as Microsoft can get product to market more quickly and with fewer distractions than a number of companies working in often contentious "cooperation." If that company can also generate the external investment required to make such a venture viable — and Microsoft can — who's to say it's not a better development process?

Those committed to Unix will certainly say it's not. The market, for now, backs them up. Unix shipments may (marginally) exceed those of NT, and OS/2 shipments grossly exceed those of NT. More importantly, both Unix and OS/2 pull many times the revenue of — and have far greater enterprise impact than — NT. But NT is, after all, a very new product.

Source: International Data Corp., Framingham, Mass

Better network services

The Windows NT Advanced Server makes considerable strides compared with historical LAN Manager products. It is much more interoperable and can be more effectively managed.

Moreover, Microsoft has begun to roll out better systems management functions such as Hermes. Such capabilities are essential to growing NT's base among IS shops.

Despite these improvements, NT is not enterprise-ready today. Nor will it be fully so for some years. Today's NT Advanced Server, in fact, does not scale easily beyond a LAN/workgroup level of 25 to 50 clients.

NetWare remains the king of network operating systems. While Novell faces a difficult product line transition to NetWare 4, there seems to be little reason to suspect that it will lose its network server crown to NT — or any other challenger — in the process.

Where now?

The often consuming question of whether NT will eventually turn the tables on Unix and OS/2 remains within the realm of tea-leaf readings. Leading indicators, particularly developers' commitments and ports, are good signs.

NT now has strong commitments from AT&T, Intergraph Corp., Mips Technologies, Inc., Sequent Computer Systems, Inc. and others known for Unix products, as well as from Digital, Executive Software, Inc. and others known for VMS products. Of course, such commitments are always hedged. Remember how committed Microsoft was to OS/2? Despite the hype and excitement for NT today, anything can happen.

But with improved products such as the faster, lighter Daytona version of NT and a few years' maturation, NT will very likely be a credible, though not dominant, player in the client/server world.

Would Microsoft consider this a success? Maybe not, given the DOS/Windows hegemony to which it's accustomed. But the fact that NT is playing a client/server role rather than dominating the game provides a clear win for users and independent software vendors. ■

BUYERS' SCORECARD RATINGS

(Based on a 1-to-10 scale where 10 is best, 50 users surveyed)

Overall score: 63

Ease of use

- 6.8 Installation
- 7.1 Usability of GUI

Performance

- 6.8 Preemptive multitasking
- 6.6 Client/server development
- 6.5 Distributed computing
- 6.7 Integrated network and workgroup computing

Reliability

- 4.9 Integrated security
- 5.8 Built-in fault tolerance
- 6.5 Integrated systems and network management
- 6.5 Application and system integrity

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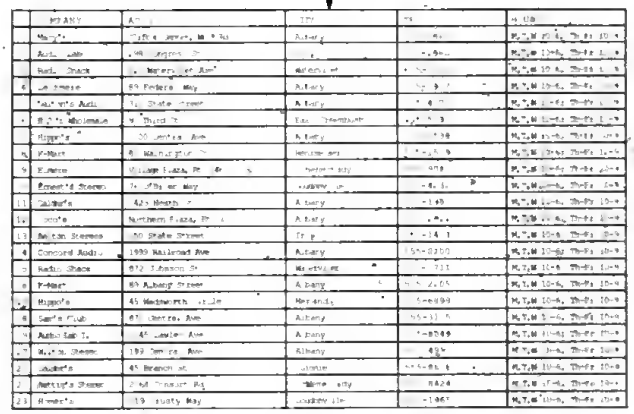

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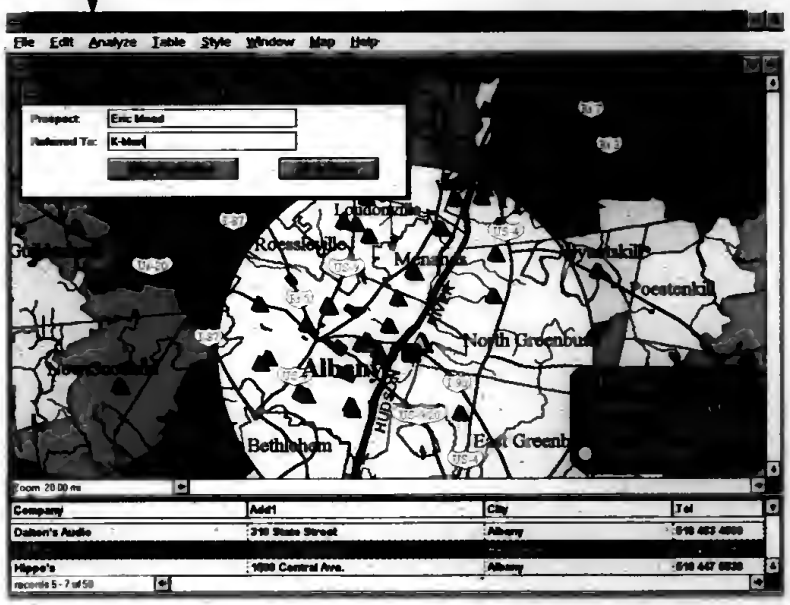

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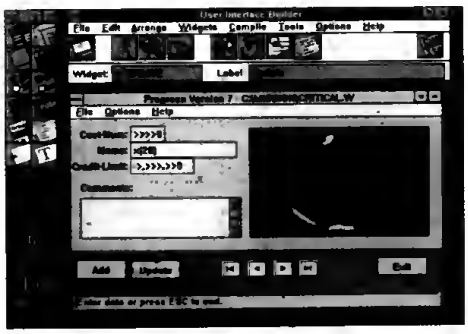

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OS/2: Technically strong, future unresolved

Five years old, OS/2 is better than it used to be. But what role will it play?

By Jonathan Eunice

Of the systems examined, OS/2 has by far the best interoperability with the mainframes, AS/400s and SNA networks common to IS shops.

Not only does OS/2 connect well to SNA, it offers a Database Manager, CICS on-line transaction processing monitor, development tools and other layered products compatible and interoperable with the rest of the IBM world. Windows NT and Unix, in contrast, offer only basic access to SNA.

Early, strong OpenDoc support

Of the environments reviewed, OS/2 will have the first and strongest support for the forthcoming OpenDoc compound document architecture. Often portrayed as a competitive response to Microsoft's Object Linking and Embedding (OLE) technology for linking applications, OpenDoc does this and more.

Like OLE, it allows several applications to cooperate to create a single compound document. However, its linking is more sophisticated — for example, it easily links across networks of heterogeneous systems. By focusing on how OpenDoc improves upon OLE, however, you miss the larger issue.

OpenDoc transcends the publish-and-subscribe genre. It's not another embedding technology but rather a redefinition of how applications are constructed. It focuses on enabling off-the-shelf software components, or bringing home object-oriented benefits to Joe User.

Like most paradigm shifts, OpenDoc and the component-oriented software it fosters will start slowly and then snowball. That process will begin with initial deliveries for OS/2, Windows and Macintosh in late 1994. One to two years from now the approach will be rapidly gaining support and importance.

Maturity

OS/2 is not a new product. Indeed, more than five years ago, many thought it would replace DOS in just a few years. At the time, Windows wasn't even considered a possibility — particularly since Microsoft and IBM were still happily married. Remember those good old days?

Well, the rosy projections foundered, the acrimonious divorce came and went and OS/2 development shifted to IBM. Eventually, the phoenix rose. An older and wiser OS/2 emerged.

Today's OS/2, Version 2.x, isn't anything like the OS/2 of yore. It looks good and works well. It is mature, proven and well-supported. Though productivity applications have not been programmed natively for OS/2 very quickly, its support of DOS and Windows helps considerably.

In contrast, NT is a very new and largely untried system. And while Unix overall is mature, both Solaris and UnixWare are relatively new to the market.

Solidity and maturity, though "boring" issues, should be major considerations when implementing an enterprise application, a highly accessed server or a mission-critical database. While the advantage for OS/2 (and somewhat for Unix) will diminish over time, it takes many years to properly age an environment. Thus, OS/2's older and wiser status works well.

Uncertain directions

OS/2 is just one of many IBM operating system initiatives. It adds to MVS, VSE, VM, OS/400, AIX/6000, PowerOpen, Workplace OS and Taligent, among other products. The multiplicity continually prompts questions of focus and commitment.

IBM's commitment to OS/2, however, is pretty unassailable. IBM has not wavered appreciably in its commitment in the more than five years since OS/2's announcement.

On the other hand, exactly what direction this commitment will take is very much in question. Even IBM, or maybe especially IBM, does not seem clear on that. OS/2 is being enhanced, both with multiprocessing at the kernel level and with additional layered middleware.

But will IBM's forthcoming Workplace OS, which runs on PowerPC and features an OS/2 "personality" atop a Mach microkernel, take over? If so, how and when? If not, how will they interoperate and how will they compete?

IBM's possible Taligent offerings — an object-oriented operating environment analogous to Microsoft's Cairo — add further possibilities. A likely scenario is Workplace OS forming a kind of "OS/2 Version 3" to which OS/2 users will incrementally migrate in several years if PowerPC succeeds.

While not a bad approach, this scenario introduces the discomfort of a major product line transition.

Where now?

Often restrictively positioned as the next generation for True Blue customers, OS/2 today is more broadly attractive. Mature and comparatively slim, it supports most Windows and DOS applications, as IBM says, "better than native Windows and DOS." Native OS/2 applications, especially for servers, round out the product and extend its reach. While future directions remain murky, IBM seems certain to continue strong support and investment. OS/2 has become, and will remain, a credible client/server option. ■

BUYERS' SCORECARD RATINGS

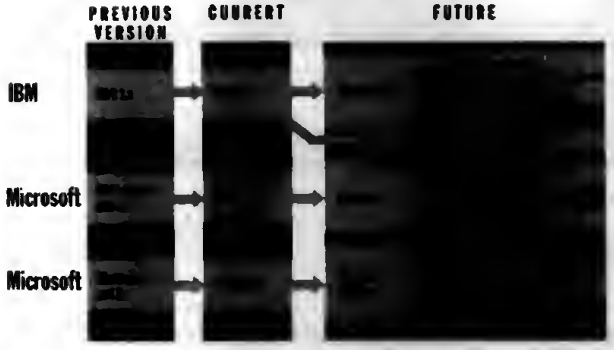
(Based on a 1-to-10 scale where 10 is best, 50 users surveyed)

Overall score: 64

Ease of use	
6.0	Installation
7.3	Usability of GUI
Performance	
7.7	Preemptive multitasking
7.0	Client/server development
6.8	Distributed computing
6.3	Integrated network and workgroup computing
Reliability	
5.6	Integrated security
6.0	Built-in fault tolerance
5.7	Integrated systems and network management
7.4	Application and system integrity

Source: International Data Corp., Framingham, Mass.

OS/2 vs. WINDOWS TIME LINE



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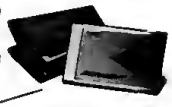

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Unix: Still divided, but a strong contender

The recent alliance will not eliminate multiple conflicting standards

BUYERS' SCORECARD RATINGS

(Based on a 1-to-10 scale where 10 is best, 50 Solaris users surveyed)

Overall score: 65

EASE OF USE

- 6.0 Installation
- 6.4 Usability of GUI

PERFORMANCE

- 7.4 Preemptive multitasking
- 7.3 Client/server development
- 7.0 Distributed computing
- 7.0 Integrated network and workgroup computing

RELIABILITY

- 6.3 Integrated security
- 5.2 Built-in fault tolerance
- 6.6 Integrated systems and network management
- 6.7 Application and system integrity

By Jonathan Eunice

There isn't just one Unix, there are many. For Intel systems the most prevalent are Novell's UnixWare, The Santa Cruz Operation's (SCO) Open Desktop and SunSoft's Solaris. Of these, SCO is the long-time competitor and clear market leader.

Relative newcomers Solaris and UnixWare challenge SCO with a combination of newer technology and more leveraged distribution channels. For the most part, however, these environments share similar strengths and weaknesses based on their common heritage and design. Unless specifically noted, we will refer to all as simply, "Unix."

PORTABILITY AND SCALABILITY

Neither NT nor OS/2 can best Unix for portability. One version or another runs on just about every commercially viable processor. While annoying differences among these versions exist, the differences are manageable. They have not stopped substantive applications portability.

NT offers better system-to-system commonality, but across only a few architectures. OS/2 lags behind both because it is bound to the Intel CPU. Though IBM plans an OS/2-like personality for the forthcoming Workplace OS, this will appear only on PowerPC platforms.

Unix similarly wins in terms of system scalability. Solaris, for example, runs from laptops to 20-CPU multiprocessors. Other versions of Unix go even higher.

Unix, *page 105*

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Unix

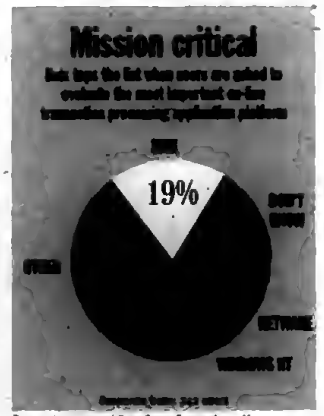
CONTINUED FROM PAGE 103

NT has a good multiprocessing design, though it is relatively untested in practice.

OS/2 is slated for a symmetrical multiprocessing update but has none now. Considering their later development, neither NT nor OS/2 seem likely to match Unix's scalability in the next several years.

Another aspect of scalability relates to the network. Unix is again far stronger than NT and OS/2. While Unix's native TCP/IP and Network File System protocols have their weaknesses, they have been proven practical in years of large-scale, worldwide use.

In contrast, NT and OS/2 native net-



Source: International Data Corp., Framingham, Mass.

working focuses on LANs supporting small workgroups. This is true even after recent upgrades from IBM and Microsoft. Unix's network scalability will prove particularly important for enterprise-scale networks.

HEAVYWEIGHT HANDSTAND

Unix vendors have spent at least five years trying to tune their systems for smaller configurations. While resource requirements have fallen, they have done so only gradually.

Unix remains a relatively heavyweight environment. This is also a problem for NT and somewhat of a problem for OS/2. IBM and Microsoft have relearned the Unix lesson that it's hard to do more and more with less and less.

The problem is worse for Unix, however. Political considerations and historical baggage have led Unix to heavyweight solutions for many system layers. The Unix kernel design, the Unix application programming interfaces and X Window System graphical user interface are just three examples.

Moreover, the emerging Unix truce will make the situation worse. A precondition of the truce was a nonjudgmental approach to the technologies over which the vendors fought.

So instead of choosing just one remote procedure call standard, network naming standard, distributed file system standard and so on, the vendors have agreed to take on several of each. Conclusion: Buy more disk. And more memory. And more performance. You'll need them.

WHERE NOW?

Though Unix no longer has realistic hopes of becoming the post-DOS volume desktop of choice — if indeed it ever did — the environment is increasingly successful and accepted in two roles.

The first, as a specialized desktop for some professional workers, is derived from the workstation days. This will provide most Unix volume.

Most of the enterprise impact, however, will be driven by the second role: enterprise servers running databases, communications infrastructures and custom applications. These uses suit Unix's now grown-up status, not to mention its applications base and the skills of most major Unix vendors.

WHO WILL LEAD?

The jury is still out on whether Unix will become the dominant server operating system for all environments. Users will have to get over disappointments with standards efforts and concerns about ease of use to make it broadly accepted. ■

Beame & Whiteside Software™

News Release

FOR IMMEDIATE RELEASE
March 14, 1994
Contact:
George Stevenson
Beame & Whiteside Software
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Tom Woolf
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Beame & Whiteside Ships First NetWare Server Software for Windows NT

MultiConnect for Windows NT Extends NetWare Connectivity to Encompass Microsoft's New Network Technologies Platform

RALEIGH, N.C.— Beame & Whiteside Software announced that the company's new connectivity software to link Novell NetWare users to services on Microsoft's Windows NT platform begins shipping today. With MultiConnect for Windows NT, Novell NetWare users gain seamless access to Windows NT files and printers, allowing them to extend installed NetWare platforms to encompass additional computer systems. MultiConnect is the only product that offers full NetWare file server emulation for Windows NT.

MultiConnect for Windows NT extends NetWare connectivity by adding the IPX/SPX protocol stack to any machine running Windows NT. It is implemented as a set of loadable Windows NT drivers, so no additional software is required on the NetWare side. As a result, NetWare users gain direct network access to Windows NT-based files and services to take advantage of many of the features of Windows NT while still supporting native NetWare. And since the link is made at the Windows NT kernel level, connectivity is fast and seamless.

Windows NT offers network users a number of distinctive networking advantages over NetWare. The platform is protocol independent, it can be readily integrated into heterogeneous wide area network environments, has both NDIS support for multiple simultaneous protocols, and is scalable to both RISC and SMP computers. Windows NT also offers preemptive multitasking and is multithreaded.

"The beauty of MultiConnect for Windows NT is that Novell customers don't have to abandon NetWare to encompass new platforms," said George Deffendall, Vice President of GraphNet Systems. "As an AutoCad reseller, we have customers who want to add AutoCad to their networks, but you can't run AutoCad on a NetWare server. Windows NT provides a nice, stable server environment, and you often want to run AutoCad on your server machine. With MultiConnect for Windows NT, our customers can set up one machine that runs both Windows NT and AutoCad, and still access NetWare."

The MultiConnect for Windows NT file server includes independently developed MS-DOS utilities, such as LOGIN, LOGOUT, SLIST, MAP, ATTACH, and DETACH, which are similar to their NetWare counterparts, so that MultiConnect for Windows NT can operate without other NetWare servers on the LAN. A programmer's library of API calls is also included.

Licensing fees for MultiConnect for Windows NT range from $849 for five users to $9,695 for an unlimited license.

Beame & Whiteside Software specializes in developing and marketing TCP/IP and NFS connectivity solutions for DOS and Windows computing environments. A network of international distributors sells and supports all of Beame & Whiteside's standards-based connectivity software. Beame & Whiteside Software can be reached at 706 Hillsborough Street, Raleigh, NC 27603-1035, telephone: (800) INFO-NFS or (919) 831-8989; FAX: (919) 831-8990, or via Internet at sales@bws.com.

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SunSoft's Solaris 2.3:
Users say it gets better with age

Solaris 2.3

Computerworld's Firing Line is an evaluation based on interviews with major users at corporate and educational installations. The product under evaluation is being used in live application environments.

- Solaris evaluators said the operating system adds new features and better reliability with each revision.
- They added that performance, technical support and ease of use could stand additional fine-tuning.

Most operating systems have a checkered history of early releases, but few rival SunSoft, Inc.'s Solaris.

Originally released in mid-1992, Solaris 2.0 faced a large installed base of SunOS 4.x users who did not want to migrate to an unproven operating system (even though it was based on SunOS 5.x). Bug reports have persisted throughout its history, although users say features are improving and problems have been reduced.

The most recent release, Solaris 2.3, shipped last fall and includes a new display system in the form of Adobe's Display PostScript. It also boosted network and transaction performance, added Asynchronous Point-to-Point protocols and included C2 security and a host of new network administration tools. Version 2.4 will be announced this week.

Evaluators assisting in this survey included technical personnel from a university, a software firm, an electronics manufacturer and a financial company.

The format for this evaluation was designed with the aid of Howard Rubin Associates and Technology Investment Strategies Corp.

Installation

Installation posed no difficulties, the evaluators agreed. All installed from CD-ROM and had their Solaris 2.3 systems running in a matter of hours.

Developer: "Installation is mindless. You install the CD-ROM, answer a few questions and go to lunch."

Electronics firm: "The interface for picking and installing packages is much better. You pick and choose the parts of the system you want to use."

Reliability

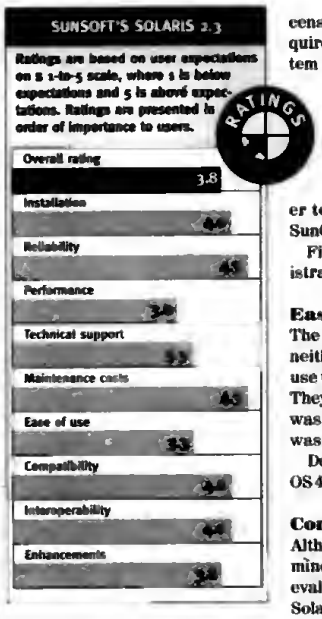
The evaluators' high reliability scores are hard to reconcile with longstanding complaints about Solaris. Since its initial release, Solaris problems have been scrutinized by the press and users. Many companies have opted to use Sun's older but more stable SunOS 4.x operating system. The evaluators said problems had noticeably declined in Solaris 2.3, and they expected more stability in future releases.

Developer: "Less than 2% of all failures have been serious."

Financial firm: "It's much more reliable than you expect it to be."

Performance

The evaluators complained of mysterious slowdowns in processing on Solaris 2.3. Some had run extensive load tests to determine the problem, but to no avail. Others said its enhanced utilities and programs caused some performance problems.



University: "It gets slow even on stand-alone systems."

Electronics firm: "It's significantly faster than [Solaris] 2.2."

Technical support

As technical users and Unix administrators, the evaluators had little need for extensive handholding from SunSoft personnel.

Developer: "If I can get the patches I need to make it work, then I don't care" about technical support.

Electronics firm: "The acceptability of the patches and the ease of finding them is a real plus."

Maintenance costs

All sites had negotiated site licenses with SunSoft or had acquired the Solaris operating system gratis with new workstations.

They thought maintenance costs were slightly less than with SunOS, particularly because of new, easier-to-use utility programs.

University: "It seems easier to deal with Solaris than with SunOS 4."

Financial firm: "The new administration tools are a big win."

Ease of use

The evaluators said Solaris was neither easier nor more difficult to use than other operating systems. They acknowledged that there was a learning curve but said it was minor.

Developer: "Compared to SunOS 4.x, there is no difference."

Compatibility

Although they continued to have minor compatibility glitches, the evaluators generally agreed that Solaris ran existing applications reasonably well. Where problems arose, patches and recompilation solved most problems.

Developer: "We have positioned ourselves so that compatibility wouldn't be a problem."

Electronics firm: "The backward compatibility [to SunOS] is outstanding."

Interoperability

Interoperability with other network operating systems is acceptable, evaluators said. Collectively, they had run Solaris 2.3 in conjunction with IBM's AIX, Hewlett-Packard Co.'s HP/UX and SunOS 4.x.

Enhancements

The evaluators said the biggest enhancement to Version 2.3 was a reduced bug count and better performance. The new administration tools were the most cited new feature.

University: "Solaris is much more useful than SunOS 4.x."

Developer: "We don't take advantage of many of the new features."

Electronics firm: "We like the new windows system and ability to run Wabi. Solaris has significant features over SunOS." ■

Written by Computerworld *senior editor Garry Ray.*

SunSoft responds

SunSoft's David Taber, director of commercial Solaris, responded to issues raised in this evaluation.

▶ **Reliability: Our internal [reliability] metrics for Solaris 2.3 are all above those of 2.1 and 2.2. As of last Friday, Sun met its commitment to run all of its internal desktop machines on Solaris 2.3, as well as more than 80% of its internal servers.**

▶ **Technical support: There is a lot of emotion about moving from Solaris 1 to Solaris 2. There are a lot of changes. There is a cost to any transition, even a desirable one. We have more than 15 books explaining transition issues, and we have migration tools and facilities to help.**

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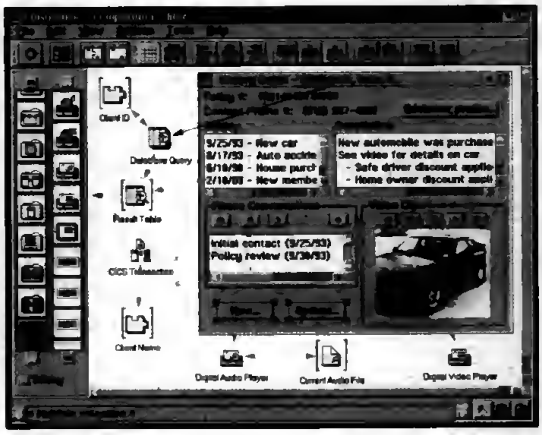

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RAID 5	No	Yes	Yes
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Dynamic Read Cache	No	No	No
Customer Replaceable	No	No	No
	N/A	Standard	25% FASTER

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MODEL 20s	9337-020	9337-120	9337-225
Front Panel Selectability	No	No	Yes
RAID 5	No	Yes	Yes
Mirrored Write Cache	No	No	Yes
Dynamic Read Cache	No	No	No
Customer Replaceable	No	No	No
	N/A	Standard	25% FASTER

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THEY'RE GETTING BEAT UP ABOUT SLIPPING BUDGETS AND LATE PROJECTS.

THEY'RE EXPECTED TO KEEP UP WITH NEW TOOLS AND TECHNOLOGIES — BUT NOT FORGET ANYTHING TO DO WITH LEGACY SYSTEMS.

THE SOFTWARE DEVELOPMENT CREW: *(From left to right) Sogei's Domenico Natale, AT&T's C. Marlow Hinton, TDS' Karon Peterson, Du Pont's Elly Williamson and ISSC's Dewelt Smith*

cool UNDER fire

FIVE PROS WE TALKED WITH ARE DEALING WITH THESE PRESSURES HEAD-ON.

THEY REVEAL WHAT IT TAKES FOR DEVELOPMENT TEAMS TO MAKE IT IN THE '90s.

"Companies cannot wait three to five years anymore for systems," says C. Marlow Hinton, manager of new tools/technology for AT&T's internal information systems staff in Greensboro, N.C. "If you do something in such a long time frame, you just aren't able to compete."

Hinton and his software development peers are acutely aware that the heat is on them to deliver for their companies what has become the linchpin of a successful information technology strategy — software development. Without a finely tuned development team cranking out quality systems to support business processes, most companies can kiss their competitiveness good-bye.

Recently, Hinton and four industry colleagues (see pages 112 to 113 for participants) sat down with Senior Editor Lory Dix to discuss their development concerns. In addition to zeroing in on user satisfaction and developer productivity, these IS professionals each put in their two cents about tools and techniques such as object-oriented programming and joint application design. They also spoke candidly about the effect increased scrutiny on development has had on staff in the trenches.

Computerworld's roundtable took place in Boston at an Advanced Software Measurement Practices workshop sponsored by Burlington, Mass.-based Software Productivity Research, Inc. SPR is headed by development guru Capers Jones.

CW: What would each of you say is your No. 1 software development concern?

AT&T's C. MARLOW HINTON: Measuring productivity. We've found that the better we can optimize our resources, the more it will help lower costs. That would be welcomed by our [users].

Roundtable, *page 112*

Roundtable

CONTINUED FROM PAGE 111

We're also dealing with user-friendliness. We put a lot of effort into making sure what we produce meets the needs of our customers who can be very diverse in terms of computer literacy and skill levels. We've got a usability lab that enables us to observe how people react to [newly developed software].

We have tested more than 44 applications in the lab. Nearly 30% to 40% of all software goes through it, and the numbers are growing. It's been so successful as a gauge for user-friendliness, we're building another lab.

IBM'S INTEGRATED SYSTEMS SOLUTIONS CORP.'S DEWELL SMITH: Our concern is satisfying our users — finding out what their requirements are, getting those out on the table and, once we understand them, making sure we're in a position to have the right skills to meet those needs. We want to get ahead of our customers.

we are providing value? It's one of the reasons we've headed into a measurement program.

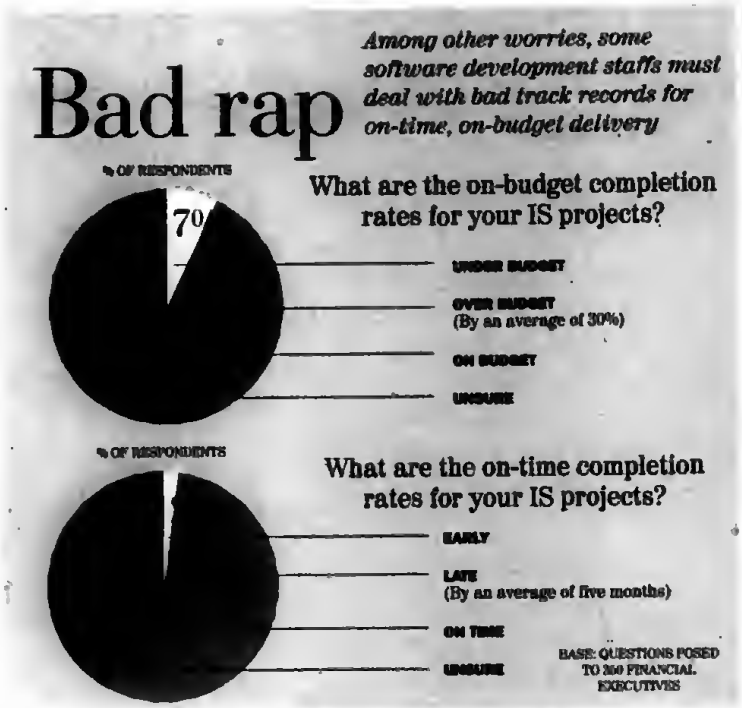
CW: How do you respond to critics who say measuring software productivity is impossible?

HINTON: If you try to increase productivity by adding a new tool or adding some functional way of doing things, people still say, "Well, you made other changes, too. How do you know productivity wouldn't have increased anyway?" How do you measure the real impact of, say, new tools? How do you isolate exactly what's making you productive?

SOGEI'S DOMENICO NATALE: But that's exactly why measurement is so important to software. Software is an abstract process. A lot of things happen in the minds of people. With measurement, we can make the process visible. This is very important to controlling costs and improving the reliability of our services.

CW: Are your developers afraid to be measured?

SMITH: In some large companies,



Source: Institute of Management Accountants' Management Information Systems & Technology Group, Montvale, N.J.

"Technical staff feel management may not appreciate the Herculean jobs they're doing these days. Measurement may be the best game in town for recognition."

The hot button is definitely client/server. Our platforms go from large mainframe systems that do order entry and reporting to some client/server applications to allow marketing folks to get at data from a large warehouse.

DU PONT INFORMATION SYSTEMS' ELLY WILLIAMSON: Our major concern is delivering value to the businesses in a timely fashion and at a reasonable cost. I think in the '90s, the cost piece has become a little more important. There's lots of downsizing activity, which translates into zeroing in on a productivity improvement, trying to do the same or even more with fewer people.

TDS COMPUTING SERVICES, INC.'S KARON PETERSON: Our hot button is the cost of our services. Our computing services area is considered a service bureau to the organization at large. [Users] feel that the costs of our services are too high. How can we show them developers think, "You're going to pit my organization against this other organization that's doing something different. We're doing mainframe over here, they're doing [rapid application development] over there. We can learn from each other, but don't say I'm a bad guy because I have this big legacy system I'm working with." That's a fear of measurement that comes out sometimes.

The task is to make sure that everyone understands that we're looking at all those attributes and are trying to learn from one another.

WILLIAMSON: Ten years ago we talked a lot about fear of measurement. To a large extent, such a thing doesn't exist anymore, particularly among the technical staff. I think the technical staff is absolutely eager to be measured.

Technical staff generally feel that life has gotten more complicated and that management may not appreciate the superior, Herculean jobs they're doing these days. Measurement may be the best game in town for [recognition].

I think what people are afraid of is not measurement but of the inappropriate use of the data. They're afraid [measures] will be taken out of context and used by somebody who doesn't understand what's going on and can't appreciate the differences in, say, two systems they're comparing. And that's really a little different from being afraid of being measured.

I think to the extent you interpret the data correctly, most of that fear disappears.

HINTON: We recently implemented a change in our process. We encouraged people to write [software] modification requests instantly; that is, if you find a bug, write it up. We were worried that people were going to think: "Oh no, this is going to be used against me. I've got a lot of bugs in my system."

But we tell them, "That's good! That's healthy!" It brings things out into the open before they become real problems.

In fact, we publicized the bug lists of our top, top designers and developers. We acknowledged that they had found something like 500-plus bugs in their own work. We wanted to make the point that we weren't going to take action against people.

NATALE: We introduced metrics about four years ago. One part of the program is to let each programmer know what his metrics are. At this "personal" phase, the programmer himself can correct anything he's done wrong. Only after this do we gather data from everyone and summarize the group results.

In this way, the person accepts control. We don't just wound someone but let him have a chance to fix his work.

CW: Where do you see most of your software development dollars going in the next year?

HINTON: We're quickly moving to client/server, off-loading a lot of stuff from our mainframe. We're looking at hidden costs like training. There's a large diversity of tools you have to deal with from different sources.

You also have to deal with not having things that were there before, like built-in security and integration. You now have to account for that. In a networking environment, you have a distributed processor capability; you've got to maintain that. You have to isolate problems that might crop up, problems that aren't isolated in one source. They might be spread out in the PC, at the network or at the server. It's tough to get a handle on [the costs of] that.

Object technology is also a big thrust for us in '94. We have to decide how far to go beyond object-oriented programming. Are we ready for analysis and design? Is the culture right to get people to accept the benefit of the new approaches? Our toughest work is

Who's who

IN OUR DEVELOPMENT ROUNDTABLE

C. MARLOW HINTON
■ *Manager, new tools and technology, AT&T Human Resources Information Systems Organization Greensboro, N.C.*
Provides the technical direction for more than 400 technical professionals who create HR applications for all A&T employees worldwide. He is also an associate professor of computer science at North Carolina A&T State University where he teaches database systems design.

DOMENICO NATALE
■ *Head of software engineering, Sogei Rome*
An expert in software metrics with emphasis on code-level control of productivity, complexity, structure and reuse of Cobol programs.

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23 Dir./Mgr. Sys. Development, Sys. Architecture
31 Programming Management, Software Developers
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(b) Netware (f) Windows NT
(c) OS/2 (g) Windows
(d) Unix (h) NeXTstep

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the selling job — selling the technology to our internal shop first and then to convince the customer that it's the right thing to do.

WILLIAMSON: There's going to be a lot of emphasis on harvesting the benefits of existing technology. My sense is that this is at least as important as moving down some of these new paths. Ripping stuff out and moving in all new stuff was kind of an '80s thing.

CW: What are people's plans for their Cobol applications? Is there any new development going on in this area in your companies?

HINTON: Our code is about 25% Cobol, but we're not doing any new development in that area right now. We're essentially just maintaining that data as we complete our migration process [to client/server]. All our new work is primarily being done in a fourth-generation language or using [rapid application development] tools.

We've brought in contractors to maintain our legacy systems. That way we can train employees to move to new technology so we can keep them current on new development needs.

We are quite happy to see that some of our mainframe-type programmers, our Cobol developers, are fairly easily converting to some of the new development tools, such as Gupta's SQL Windows or Powersoft's PowerBuilder. Once they are trained properly, they seem to grasp the technologies quite well. That was a concern of ours.

WILLIAMSON: It's been several years since Du Pont's done much Cobol development. We have mixed-language systems, some PL/1. And we have a lot of third-generation stuff. I always thought Cobol was overrated. We have lots of code, but not that high a percentage is in Cobol.

NATALE: We are still doing many things on the mainframe. When you have a million-plus lines of Cobol code, you can't destroy it and just rebuild in another language. We're paying a lot of attention to control Cobol's complexity and structure to improve the maintainability of the system.

CW: We can't talk about "conserving" or "maintaining" without talking about reusable software. Where do you stand on the idea of reusability?

NATALE: A while ago, I found a beautiful book written by your vice president, Al Gore. It was his report on reinventing government. The words on the cover said something like "each organization wants to work better and spend less."

We think that reusability is perhaps the most important factor in reducing cost. Our main goal is to implement a tax information system for the Italian Ministry of Finance. It is important to have a system that is easy to maintain and change because fiscal legislation always varies.

C. MARLOW HINTON
AT&T

"If you have a self-contained object and you can go in and just fix where the problem is, you find your costs become much, much less."

HINTON: If you have a self-contained object and you can go in and just fix where the problem is in that object and not have to re-engineer the entire system to make a modification, you find that your costs become much, much less.

NATALE: In software, we have to build something like a store in which you can find anything you need in a few minutes. Companies have to classify everything so it is very easy to find a piece of software or a program or make something with only minor changes.

Such "software stores" make things easier to find again, make it easier to rebuild a system. In this way, you can optimize your system and reduce software duplication.

SMITH: We are attempting to do as much reuse as possible. Some of it is object-oriented. We are investing there. We are looking at trying to build libraries we can share, not only within our particular development organization or site but also throughout the company and the various sites in ISSC.

CW: How serious a commitment do your staffs have to such techniques as object-oriented programming, rapid application development or joint application design [JAD]?

SMITH: We do use JAD and joint application requirements sessions quite heavily at ISSC, especially for client/server types of new applications.

For instance, we've got an ISSC site in Dallas that has an almost 24-hour development cycle. They bring the customer in and do a big long JAD session. The prototypers then come back the next day with systems based on what they heard and understood. If they hear the screams, they go through that process again.

That gets the user more and more involved up front to make sure that we do have the right requirements and we're working on the right things.

HINTON: We've found that trying to drive [new tools and techniques] down to developers by saying, "You should use this," just doesn't work. You've got to get their hearts as well as their heads. If you can't do that, you're just out there pushing upstream. You don't get any benefits.

CW: In terms of tools, there seems to be a comeback by computer-aided software engineering (CASE) technology. What can CASE do for you today that it hasn't been able to do for you in the past?

WILLIAMSON: I think part of what we're seeing is a slow maturation of the industry. To the extent that we demand that each new thing down the pike is a panacea, it's always a disappointment. CASE has been through that; now it's object-oriented and client/server. None of them solves all of our problems.

When [a technology like CASE] comes back around again, one of the things that's changed is that we're all a little bit smarter. Maybe our expectations are a little more realistic in terms of what role a specific technology innovation can play in our overall [technology] plan. I think that probably has at least as much to do with the maturity of the industry as it does with the maturity of CASE.

PETERSON: You've got to identify what's useful to you in CASE tools. There are so many different things that CASE tools do, so many different aspects. It's not just code generation, front end and back end. Companies have gotten a lot better at recognizing which parts are going to benefit them.

[Regardless of the quality of CASE,] those companies that don't have some kind of [life cycle] process in place find it very difficult if they decide to bring in CASE tools.

HINTON: One of the problems we ran into early on is that CASE tools were sold as code generators. People only looked at that aspect of it and really didn't see it as a way of doing things in a structured environment.

Now, just as vendors are starting to catch up with CASE in the client/server world, a lot of people are starting to look at object orientation, which really employs another analysis and design technique. CASE vendors are trying to convert their existing products, but they have to be very careful. There are other techniques and methodologies out there that are better able to handle object orientation right now.

CW: Many of the tools and techniques we've talked about will reportedly help with people's applications backlogs. Where do your applications development backlogs stand today?

HINTON: We can't wait three to five years anymore. Even for our large systems, maximum development time tends to be a year and a half to two years at most. And even that's becoming long term. The marketplace is changing so rapidly and technology is changing so quickly that if you do something in three to five years, either the requirements don't fit any longer, your customer requirements have changed or you just aren't able to compete in delivery of systems.

We won't defer work or put it off for the long term. If we have to, we'll outsource or hire additional people or move internal people around.

NATALE: I believe software reusability can help here.

Who's who

KARON PETERSON
a *Senior methods analyst*
TDS Computing Services, Inc.
Madison, Wis.
Has 20 years' experience in data processing with nine years providing research, training and support in a development environment.

DEWELL SMITH
a *Systems analyst*
IBM's Integrated Systems Solutions Corp.
Atlanta
Currently responsible for facilitating a consistent estimating and measurements approach for ISSC's internal technology development.

ELLY WILLIAMSON
a *Consultant*
Du Pont Information Systems
Elkton, Md.
Specializes in helping senior information technology managers understand and apply metrics.

DEWELL SMITH
ISSC

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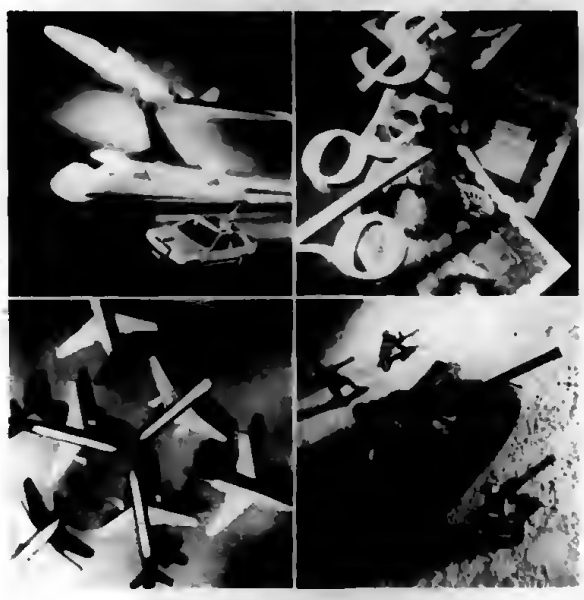

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Pesky [redacted] to projects

By Julie Hart

If you're serious about completing projects on time and within budget, now is the time to assess your project management style. According to the Center for Project Management, 73% of the companies it surveyed have inadequately defined project plans.

"Too often, people talk about an idea for a few days and then jump right into executing the work," says Gopal Kapur, president of the San Ramon, Calif.-based center. "This is why projects go awry."

Prompted by missed delivery dates and budget overages, many information systems managers are seriously contemplating their approach. Pacific Bell's Systems Technology and Operations Group in San Ramon, for example, implemented a formal project management methodology.

"Getting senior management support was difficult," says staff manager Phyllis Audiss. What finally convinced management of the value of project managers was seeing an improved success rate for meeting project deadlines, staying under budget and delivering functionality.

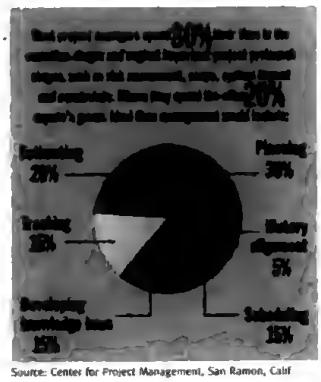
Do your homework

Although Pacific Bell's senior management still tends to be date-driven, Audiss says, project managers have learned to avoid discussing delivery dates until after their homework is done. "If you say a project will take six months, management thinks it means six months from now," she says. "And we may not even have our team together yet."

To strengthen your stance, experts recommend supporting your position with data. For example, when management insists on unreasonable delivery dates, stand by your project analysis. "If necessary, show [management] your task list and ask them which ones they'd like you to cut," Audiss says.

Pacific Mutual Life Insurance Co. in Newport Beach, Calif., avoids these misunderstandings by including senior management on project teams. "It's not unusual for a system [vice president] to work with a head clerk," says Julie Wilson, implementation manager. Together, the team determines every project aspect, including scope, cost, scheduling and resource management. "This is why we meet our schedules 90% of the time," she says.

As more companies migrate to client/server, controlling projects becomes even more critical.



Source: Center for Project Management, San Ramon, Calif

"Client/server introduces a new set of problems," Kapur says. "You're moving technology out to the client and expecting them to do everything on their own."

Kapur's solution is to involve the client in the entire process. "Get the most productive person," he says. Otherwise, the least busy and least knowledgeable person will be assigned.

Unlike the mainframe world where projects typically run more smoothly, client/server introduces a new set of tools and design methodologies. "When bringing in new technology, people tend to underestimate the learning curve," says Wayne Schmidt, a consultant at Microsystem Consultants in Eagan, Minn.

If proper thought is not given to new technologies, 90% of client/server projects will be late, Schmidt estimates. "You can either plan for it or let it disrupt your project," he says. ■

Hart is a free-lance writer in San Jose, Calif.

GOOD PRACTICES GET GREAT RESULTS . . .

. . . Unfortunately, few companies have set project management guidelines, resulting in underestimated projects

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A VANISHING BREED?

Client/server development and a reliance on off-the-shelf solutions will change the maintenance programmer's role, but demand is expected to continue for professionals with the right skills.

By Leslie Goff

Despite the perception that retirement is the next step for most maintenance programmers, the outlook is promising. Software maintenance comprises about half of the information systems activity at most companies, and according to experts, 70% of most applications still exist on legacy systems.

While the tedious nature of the job has contributed to its low-level reputation, the reality is the opposite, notes Peter Salfi, project director for operations and maintenance at SHL Systemhouse, Inc.

"It's not as sexy as development," Salfi agrees. "Everyone wants to be the artist, but very few want to be curator of the museum. To present the artwork well, however, you have to be a very good curator."

But the image is changing. "If you want the most capable group to deal with the new reality [in IS], it will be those doing maintenance," says Brian Case, director of membership at the Software Management Association (SMA) in Vallejo, Calif. "They look at the whole picture and say, 'This is what we have to do as a long-term solution.'"

Client/server development and an increasing reliance on off-the-shelf applications will inevitably alter this role.

"Be ready to study and analyze many different forms of software," says Nicholas Zvegintcov, editor of "Software Management News," a bimonthly newsletter published by Software Maintenance News, Inc. in Los Altos, Calif.

In addition, maintenance programmers must be willing to adapt to the structural differences between client/server applications and large legacy systems. "With monolithic legacy systems, you have output, input and processing," explains Michael Howard, president of Clove Consulting, Inc. in Cobleskill, N.Y. Whereas maintenance programmers are used to working with systems that have no boundaries, client/server's most important boundary is the communications protocol between client and server, Howard says.

Couple this with automated development and new maintenance tools and the development cycle dramatically shortens. "The life of future legacy systems will be compressed from a 10- to 20-year life span to a three- to four-year life span," Howard says. "The maintenance programmer has to act like a development programmer or be unemployable."

Good advice

That means heeding two pieces of advice: Become a continuous learner and learn more about the business.

"We have to constantly find better ways to do what they do," says Martha Detloff, a senior business systems analyst/project coordinator at American Express Travel Related Services Co. in Phoenix and president of SMA.

At Detloff's company, groups of maintenance and development programmers spend time in the company's 800-number call centers. The result, Detloff says, is a change in how they view their work.

"What they had been working on was good in isolation," she says, "but when they saw their program along with all the other screens and the intensity of the operations, they viewed it differently."

These changes led to a shift in the value placed on maintenance staffs. Amex Travel Related Services, for example, has recently begun to view its legacy systems and information as assets to be managed, Detloff says.

In turn, the company is examining ways to reward programmers who care for those systems. "We're looking for ways to reward performance that is not connected to specific projects," Detloff says. "These people are bright; they love what they do and find it challenging. We want to add some glory to the job." ●

Goff is a free-lance writer in New York.

PROFILE OF A MAINTENANCE PROGRAMMER

Average number of years in IS:	14
Average number of years in maintenance:	10
Percentage of time spent in maintenance:	60

Source: Nicholas Zvegintcov, Editor "Software Management News"

TIME SPENT

As more applications are deployed to end users, maintenance programmers will spend more time answering their questions than ever before

Enhancements	34%
Error corrections	24%
Answering questions	14%
Adapting new hardware/software development	9%
Documentation	6%
Re-engineering, renewal, retrofitting	6%
Performance-tuning	5%
Other	2%

Sources: Software Management Association, Vallejo, Calif., and Nicholas Zvegintcov, Editor, "Software Management News"

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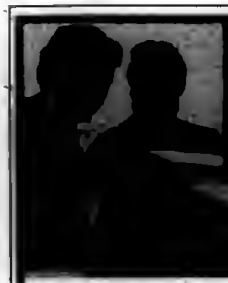

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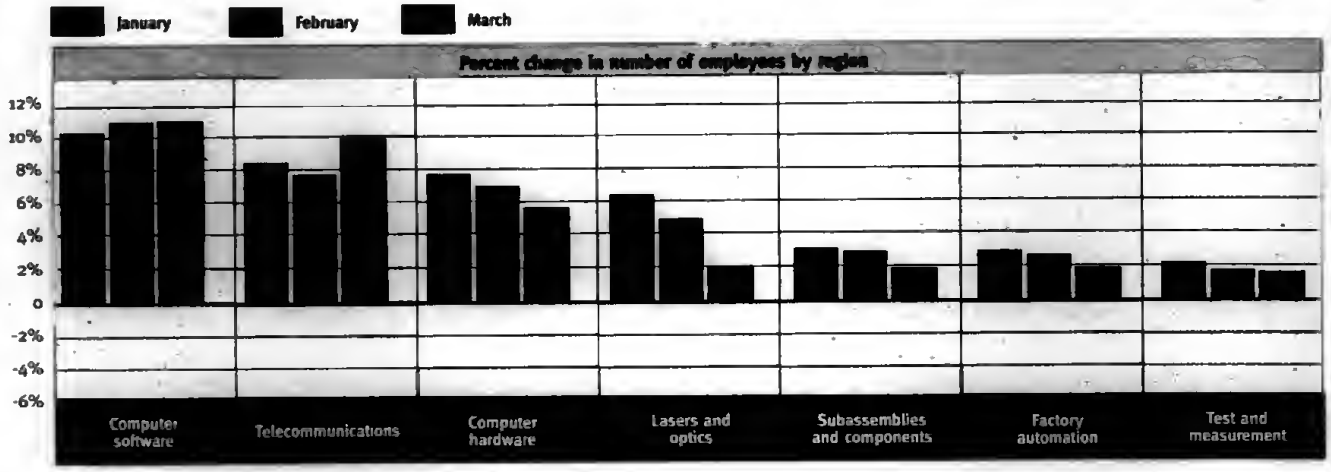

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OUTSOURCING SUPPORT:

Kudos *and* Caveats

shopper alert!

By Bronwyn Fryer

As companies continue to focus on their core capabilities, in-house technical support departments are often among the first areas to be outsourced.

"Companies should outsource when internal support reaches a certain pain threshold," says Bob Johnson, senior industry analyst at Dataquest Worldwide Services Group in Framingham, Mass. "This happens when the quality of support is unacceptable, when the expense grows abnormally large or both."

PC software support is by far the largest area to be contracted to outside firms, though many outsourcing firms offer services across the board.

But outsourcing does not mean an end to management headaches. It does mean some degree of loss of control. Therefore, it is critical to carefully manage the selection and ongoing evaluation of the outsourcing firm. In doing so, analysts recommend the following guidelines:

Overworked staff, unmet needs

Determine what your greatest needs are, whether in stand-alone or workgroup applications, for example. Because no one firm can be expert in everything, look for expertise in your mission-critical areas, then make sure the vendor is proficient in them.

Find out the size of the vendor's support staff and what kind of ongoing training it receives. Investigate how technology expertise is distributed. If a support person is expected to handle too many products at once, expertise may be low. Finally, if support technicians are asked to spend more than 5½ hours a day on the phone — the industry average — they may be stretched too thin.

Availability discrepancies

Evaluate average call length, how long it takes to resolve a problem and the time callers spend on hold. Find out just what the vendor means by availability. "If the outsourcing firm tells you that support is available 24 hours a day, seven days a week, but in fact uses a call center/beeper combination during the wee hours, that's different," Johnson says.

Detail underload

Closely evaluate the support firm's automation and reporting capabilities. The vendor should provide regular reports about the number and the content of calls, as well as an early notice of significant change among the user base, such as when several people call with printer problems.

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Source: Dataquest Worldwide Services Group, Framingham, Mass.

Financial foothold

A fly-by-night organization spells future problems, so learn the company's history, growth rate, internal technology directions, experience and financial stability. Also, there's a lot of competition among vendors right now, but in about 18 months, Johnson estimates, the market will begin to consolidate.

Penny-pinching pitfalls

Because quality is critical, price should be of lesser importance. "Aim for a balance," Johnson says. Also look for flexibility. Rather than paying by the call, negotiate a set payment structure with monthly or quarterly billing options.

Also keep a close watch on quantifiable results. Marcus Thorp, an office automation manager at Norrell Services in Atlanta, installed a voice-activated survey to track user reaction once a call was completed. "We asked whether the caller got the correct answer, whether the response was quick and whether the support person was courteous," he says.

Thorp's company compiles the results on a monthly basis and inserts them into the vendor's quarterly reviews.

Managing the juggling act

Even with the best laid plans, outsourcing can become tricky when you're working with more than one firm, says Patrick Kelly, information systems director at Centigram, a growing 350-employee voice-mail company in San Jose, Calif.

Originally, Centigram spread support for 250 networked PCs among four support vendors specializing in PC repair, new system setups, help desk and training, respectively. Eventually, Kelly had to hire someone to coordinate the activities of the different groups.

Centigram users call Computer Hand Holding, a San Francisco-based help desk that performs a first-level diagnosis; the help desk refers unresolved problems to one of the other vendors. Each day, a Centigram employee reviews the results and updates a daily status report that is faxed back to the help desk.

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Source: Dataquest Worldwide Services Group, Framingham, Mass.

With the help of a flow chart distributed to everyone, Kelly says, "the process seems to work, but it certainly requires the help of an in-house employee to coordinate all the vendors."

If you are considering outsourcing support and need help, Dataquest offers an analysis worksheet. For a free copy, call (508) 370-6967. ■

Fryer is a free-lance writer in Menlo Park, Calif.

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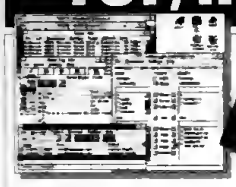

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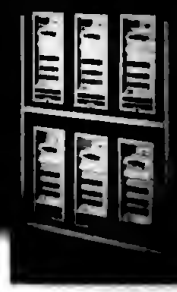

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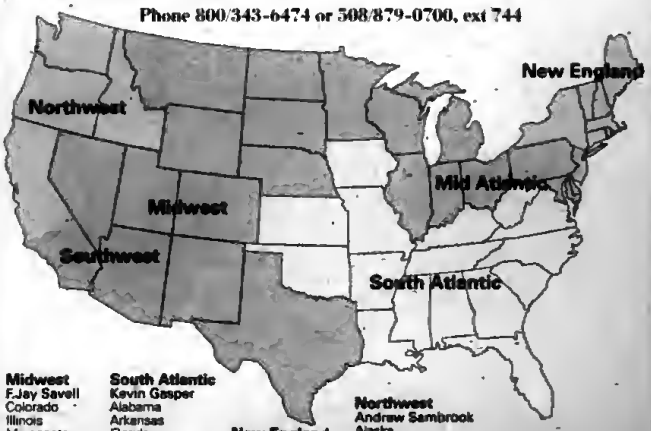

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NOTICE OF SOLICITATION

CONTRACT NO.: 94C5343
BID OPENING: Monday, May 16, 1994 at 2:00PM local time.
TITLE: Maintenance/Repair of Computer Equipment/Accessories.

Sealed bids will be received by NYCTA at 130 Livingston Street, B'klyn, N.Y. 11201 at the Bid Solicitation Counter, until the bid opening time and date. Bids will be publicly opened and read in Room 139 at said location. Bidders will be fully responsible for the delivery of their bids in a timely manner. Reliance upon the U.S. Mail or other carriers is at the bidders risk. Late bids will not be considered.

Bid documents may be obtained at the Solicitation Counter, at the aforementioned address from 9:00 A.M. to 3:30 P.M. Mon-Fri except Holidays. **Requests can be made in writing, in person or by telephone by calling Procurement Specialist, George Cohen at (718) 694-4662.**

Disadvantaged Business Enterprises will be given full opportunity to submit bids will not be subjected to discrimination on the basis of race, religion, color, sex or national origin in consideration of award. Compliance with all applicable Affirmative Action, Equal Opportunity, and Disadvantaged Business Enterprise conditions is required. A full description of these and all other provisions are included in the bid documents.

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Sealed proposals will be received by the Brevard County Board of County Commissioners until 3:30 p.m. on May 9, 1994 in the Office on Central Purchasing Division, 2725 St. Johns Building C, Melbourne, FL 32940 for the following Proposal for:

Courts Cashiering System

Specifications and proposal format may be obtained from the Brevard County Central Purchasing Division, 2725 St. Johns Street, Building C, Melbourne, FL 32940 by calling (407) 633-2036 and requesting the above proposal. Proposals must be presented on Brevard County format to be considered. The Board of County Commissioners reserves the right to reject any and all proposals. All proposals must be marked on the outside of the envelope as follows:

Proposal Number: **P-3-4-12**
Title: **Courts Cashiering System**
Opening Date: **May 9, 1994 @ 3:00 p.m.**

A Pre-proposal Meeting will be held on April 18, 1994 at 9:00 a.m. at the Brevard County Clerk's Office, 700 S. Park Avenue, Building #4, Titusville, FL 32780. Proposals must be mailed to or submitted in person to the Central Purchasing Division, 2725 St. Johns Street, Building C, Melbourne, FL 32940 prior to 3:00 p.m. on the proposal opening date.

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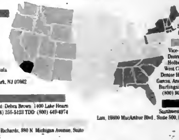

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Gainers Losers

Percent

Gainers		Losers	
Commodore Int'l (L)	166.7	Parallan Computer (L)	-31.8
Frame Technology	32.4	Weitek	-15.8
Gandalf Technologies Inc.	23.5	Magic Software Enterprises	-14.0
Go Video (L)	23.4	Software Publishing Corp.	-11.3
Micropolis Corp	22.0	Cray Computer	-11.1
Hogan Systems Inc.	18.8	PictureTel Corp. (L)	-10.7
Micrografx Inc.	17.3	Data Switch Corp	-10.3
IMRS	16.1	MathSoft	-10.0

Dollar

Gainers		Losers	
Micron Technology	13.00	Wall Data Inc.	-3.50
Motorola Inc.	7.00	Parallan Computer (L)	-3.38
Compaq Computer Corp.	6.13	Matsushita Electronics	-3.25
Xerox Corp.	6.11	Advanced Micro Devices	-2.75
Atmel Corp.	5.25	Sun Microsystems Inc.	-2.75
Progress Software Corp	5.00	Policy Management Sys.	-2.75
DSC Communications	5.00	BellSouth Corp.	-2.61
Cabletron Systems Inc	3.88	Creative Technologies Inc.	-2.50

Sun Microsystems, Inc. watched its shares tumble 19% last week after predicting disappointing third-quarter revenue. At one point, Sun stock had fallen $ 3.75, to $22, in NASDAQ trading. The Mountain View, Calif., company said revenue growth was slowed by recent product introductions that prompted customers to delay purchases.

[redacted]

IPO wrapup

A spate of high-tech companies took advantage of the high market valuations in the first quarter and jumped in with initial public offerings.

Some passed through the subsequent market downturn with flying colors; others faltered. Seven of the stocks were down from their IPO prices as of Wednesday, while others, such as Integrated Silicon Systems (ISSS) and MapInfo Corp. (MAPS), were up significantly.

Twelve of the 21 deals worth $50 million or more took place in February, according to data from New York-based Technologic Partners, Inc.

—Derek Slater

Brave souls

Despite the turbulent market conditions, a number of companies that went public in the first quarter managed good starts. (Only deals valued at $50 million or more are listed.)

Company	IPO date	IPO price	4/6/94 price
GameTek	1/25	$9	$5.25
Telular Corp	1/27	$20	$15.50
Digital Link Cor	1/31	$14	$15.75
ParcPlace Systems	2/1	$19	$20.38
MapInfo Corp	2/1	$19	$24
USA Mobile Comm	2/2	$10	$8.78*
Alantec, Inc	2/4	$13	$16.75
American Paging	2/9	$14	$10.38
InterCel	2/8	$8.25	$9
Sonic Solutions	2/10	$9.50	$10.50
DSP Group	2/11	$14	$16.25*
Softdesk, Inc	2/11	$11.50	$20
Xpedite Systems Inc	2/14	$15	$15.75
Integrated Silicon Systems	2/17	$15	$26.26
Global Village	2/24	$8	$10.25
InfoSoft International	3/1	$15	$20
Minnesota Educational Corp	3/18	$11.50	$10
Flextronics International	3/18	$14	$12
GaSonics International	3/21	$13	$15
Electronics	3/28	$13	$12.25
Applied Digital Access	3/29	$12	$19.25

*As of 3/31

Source: Technologic Partners, Inc., New York

Exch	52-Week Range			Apr. 8 1pm	Wk Net Change	Wk Pct Change
Communications and Network Services						UP [illegible]
OTC	63.75	19.63	3COM Corp	58.18	2.11	1.6
NYS	85.50	55.50	Ameritech Corp	36.50	-1.50	-3.6
NYS	65.00	50.00	AT&T (L)	50.00	-1.13	-2.2
OTC	26.50	12.60	Banyan Systems Inc.	18.00	1.75	10.8
NYS	69.11	49.25	Bell Atlantic Corp. (L)	49.25	-1.88	-3.7
NYS	63.88	50.61	BellSouth Corp	55.50	-2.61	-4.5
NYS	21.50	6.25	Bolt, Beranek & Newman	15.13	-0.88	-5.5
OTC	15.75	9.50	Brooktrout Technology	16.50	1.00	7.4
NYS	112.50	79.50	Cabletron Systems	112.75	1.88	3.6
OTC	43.00	15.25	Centigram Communications	36.75	1.25	9.7
OTC	60.25	28.75	Chipcom Corp	52.25	0.25	0.5
OTC	60.75	19.38	Cisco Systems Inc.	34.00	0.00	0.0
OTC	18.38	8.00	Compression Labs Inc	11.61	0.38	3.1
OTC	12.38	6.88	Computer Network Tech.	9.50	0.50	5.6
OTC	36.00	11.50	CrossComm (L)	13.88	1.88	13.6
OTC	4.13	1.50	Data Switch Corp	2.13	-0.25	-10.5
OTC	6.75	2.25	Digital Systems Int'l Inc	2.38	-0.11	-5.0
OTC	73.11	27.38	DSC Communications	54.50	5.00	10.1
OTC	7.50	1.75	Fibronics Int'l Inc (L)	3.00	0.00	0.0
OTC	3.59	0.81	Gandalf Technologies Inc.	1.31	0.75	23.5
OTC	1.38	0.69	Gateway Communications	0.81	0.06	8.4
NYS	17.63	8.00	General DataComm Inds.	12.63	-0.38	-2.9
ASE	3.13	1.75	Go Video (L)	2.31	0.44	23.4
NYS	39.88	29.88	GTE Corp (L)	29.88	-0.88	-2.8
NYS	95.97	72.25	ITT Corp	88.13	3.50	4.1
OTC	29.88	21.94	MCI Communications Corp	21.94	-1.31	-5.6
OTC	2.75	1.50	Microcom Inc	6.13	0.38	6.5
OTC	7.25	3.50	Netrix Corp	6.75	0.25	4.2
OTC	12.75	5.75	Network Computing Devices (L)	6.50	0.25	4.0
NYS	11.13	5.38	Network Equipment Tech.	9.38	0.88	10.3
OTC	23.38	8.00	Network General	19.38	1.75	9.9
OTC	10.13	6.88	Network Systems Corp	7.63	-0.13	-1.6
OTC	73.88	26.19	Newbridge Networks Corp	54.00	1.75	3.3
NYS	38.61	21.38	Northern Telecom Ltd	28.50	0.61	2.2
OTC	33.75	16.75	Novell Inc. (L)	17.13	-0.25	-1.4
NYS	48.88	31.25	Nynex Corp. (L)	31.88	-3.88	-2.9
OTC	30.00	19.00	Octel Communications Corp	24.75	1.25	-4.9
OTC	18.25	8.75	Optical Data Systems Inc	16.75	0.61	3.9
OTC	7.50	3.75	Penril DataComm Networks	6.25	0.00	0.0
OTC	37.25	12.50	PictureTel Corp (L)	12.50	-1.50	-10.7
OTC	8.25	3.61	Proteon Inc.	6.25	0.63	11.1
NYS	38.88	23.25	Scientific Atlanta Inc	27.50	0.13	0.5
NYS	47.00	36.75	Southwestern Bell Corp.	39.50	-0.13	-0.3
NYS	60.25	29.63	Sprint Corp	34.63	0.75	2.2
OTC	26.75	12.50	Standard Microsystems Corp	18.13	1.88	11.5
OTC	19.75	10.50	Stratacom Inc.	19.00	0.61	3.4
OTC	42.75	19.25	Synoptics Communications (L)	30.25	0.00	0.0
OTC	15.25	2.88	Telebit Corp	11.50	-0.50	-4.2
OTC	46.00	18.50	US Robotics	37.75	-0.63	-1.9
NYS	50.75	38.50	US West Inc.	40.50	0.61	1.6
OTC	87.75	58.50	Wellfleet Communications	69.63	-0.38	-0.5
OTC	28.25	7.75	Xircom	24.50	3.25	15.3
OTC	30.00	15.25	Xyplex Inc	17.00	0.11	0.7
PCs and Workstations						UP [illegible]
OTC	7.50	2.50	Advanced Logic Research	5.63	0.13	1.4
OTC	59.13	22.00	Apple Computer Inc.	33.25	0.00	0.0
OTC	33.00	12.75	AST Research Inc.	21.25	0.50	2.4
NYS	5.00	0.50	Commodore Int'l (L)	1.00	0.63	166.7
NYS	104.88	63.11	Compaq Computer Corp	104.00	6.13	6.3
OTC	34.50	13.50	Dell Computer Corp	28.88	3.25	12.7
OTC	25.00	16.75	Gateway 2000 Inc	18.00	0.88	-4.4
NYS	93.63	64.38	Hewlett Packard Co.	81.61	0.11	0.2
NYS	26.88	12.88	Silicon Graphics	23.75	1.13	5.0
OTC	32.63	21.13	Sun Microsystems Inc.	24.75	-2.75	-10.0
NYS	50.75	28.13	Tandy Corp	33.38	-2.13	-6.0
OTC	5.13	2.50	Zeos International Ltd	3.00	-0.13	-4.0
Large Systems						OFF [illegible]
ASE	7.38	4.38	Amdahl Corp	6.88	0.63	10.0
NYS	7.61	3.61	Convex Computer	5.61	-0.50	-8.2
OTC	4.50	1.88	Cray Computer	2.00	-0.25	-11.1
NYS	33.75	20.38	Cray Research Inc.	28.25	0.38	1.3
NYS	11.88	7.13	Data General Corp	7.50	0.13	1.7
NYS	48.25	27.25	Digital Equipment Corp	28.61	-0.38	-1.3
NYS	52.25	31.88	Harris Corp	44.00	1.88	-4.1
NYS	80.00	40.61	IBM	52.50	1.13	2.1
OTC	25.75	3.38	Kendall Square Research	4.00	-0.13	-3.0
NYS	175.88	113.91	Matsushita Electronics	160.75	3.25	2.0
OTC	18.75	12.75	NetFrame	15.00	0.25	1.7
OTC	26.00	6.38	Parallan Computer (L)	7.25	3.38	11.8
OTC	25.75	6.88	Pyramid Technology (L)	8.25	0.50	6.5
OTC	23.25	11.25	Sequent Computer Sys.	34.00	2.13	6.7
OTC	6.84	1.75	Sequoia Systems Inc	3.11	0.19	1.8
NYS	41.25	30.25	Stratus Computer Inc.	25.75	1.00	4.0
NYS	16.38	8.50	Tandem Computers Inc	14.75	0.50	3.5
OTC	30.00	13.50	TriCord Systems	13.50	-0.88	-6.1
NYS	16.50	9.88	Unisys Corp	14.50	0.13	0.9
Software						UP [illegible]
OTC	17.00	18.25	Adobe Systems Inc.	24.06	0.06	0.3
OTC	14.50	13.50	Aldus Corp	26.75	0.11	0.5
OTC	8.00	5.00	American Software Inc. (L)	5.61	0.13	2.3
OTC	15.75	6.75	ASK Computer Systems	8.00	0.50	6.7
OTC	61.75	37.00	Autodesk Inc.	50.88	1.30	2.3
OTC	4.50	2.38	Bachman Info. Systems	2.50	-0.25	-9.1
OTC	58.75	23.25	BGS Systems Inc. (L)	24.11	0.06	0.3
OTC	71.00	38.75	BMC Software Inc	64.61	3.75	6.2
OTC	28.25	20.38	Boole & Babbage	23.25	1.25	5.1
OTC	27.75	12.00	Borland Int'l. Inc.	13.25	-1.33	-7.8
OTC	4.61	2.75	CE Software	3.63	0.11	3.6
ASE	50.34	13.75	Cheyenne Software Inc. (L)	26.13	1.00	4.0
OTC	14.25	6.13	Cognos Inc	12.75	1.50	13.3
NYS	44.88	21.88	Computer Associates	32.25	2.50	6.9
NYS	5.38	2.13	Computervision Corp	4.25	0.00	0.0
OTC	47.25	19.25	Compuware Corp	43.75	2.11	5.1
OTC	12.75	3.75	Comshare Inc	11.00	1.00	10.0
OTC	22.00	6.83	Corel Corp.	20.38	1.50	7.9
OTC	9.00	3.38	Easel Corp	5.25	0.00	0.0
OTC	29.25	9.25	FileNet Corp	25.31	1.56	6.6
OTC	25.00	6.50	4th Dimension (L)	7.38	0.00	0.0
OTC	11.75	5.25	Frame Technology	11.25	2.88	32.4
OTC	14.00	7.00	Group 1 Software	6.25	0.00	0.0
OTC	31.75	13.50	Gupta	29.25	3.00	11.4
OTC	12.00	6.75	Hogan Systems Inc.	9.50	1.50	18.8
OTC	29.50	11.25	IMRS	25.25	3.50	16.1
OTC	44.75	12.50	Information Resources (L)	15.50	1.25	7.5
OTC	27.25	13.38	Informix Corp	20.88	0.38	1.8
OTC	12.38	8.50	Intergraph Corp	9.38	0.25	2.7
OTC	9.50	4.88	Interleaf Inc.	7.00	0.75	12.0
OTC	15.50	4.75	Intersolv Inc.	14.50	0.50	3.4
OTC	18.75	7.75	KnowledgeWare Inc	13.00	-0.25	-1.9
OTC	40.50	15.50	Legent Corp	25.50	0.75	3.0
OTC	88.50	23.50	Lotus Development	69.00	-1.00	-1.4
OTC	19.38	11.75	Magic Software Enterprises	12.75	2.00	-14.0
OTC	11.75	4.25	MathSoft	4.50	-0.50	-10.0
OTC	11.25	6.50	McAfee Associates	8.75	0.00	0.0
OTC	17.25	7.88	Mentor Graphics	14.75	0.00	0.0
OTC	37.50	13.13	Micro Focus	33.75	-0.18	-0.9
OTC	11.61	4.63	Micrografx Inc	7.63	1.13	17.3
OTC	98.00	70.38	Microsoft Corp	87.25	2.00	2.1
OTC	37.75	15.88	Oracle Corp	32.31	0.94	3.0
OTC	44.75	22.50	Parametric Technology	28.00	0.61	2.3
OTC	41.38	26.00	PeopleSoft	34.75	0.75	2.2
OTC	6.25	3.50	Phoenix Technologies	5.50	0.13	2.3
OTC	69.50	32.00	Powersoft	55.00	0.50	0.9
OTC	39.75	8.50	Platinum Software	20.50	1.00	8.7
OTC	16.75	7.25	Platinum Technology	12.38	0.50	4.2
OTC	60.75	32.25	Progress Software Corp	49.25	5.00	11.3
OTC	4.09	1.94	Quarterdeck Office Sys.	2.88	0.06	2.2
OTC	32.00	15.75	Rainbow Technologies Inc. (L)	17.25	1.25	7.8
OTC	11.38	4.25	RasterOps	5.50	0.13	2.3
OTC	14.50	4.50	Ross Systems	5.50	0.00	0.0
OTC	28.75	11.00	Sapiens Intl. Corp. N.V	11.75	-0.25	-2.1
OTC	14.00	9.75	Softkey International Inc	10.63	0.63	6.3
OTC	9.25	5.50	Software Publishing Corp	5.88	-0.75	-11.3
OTC	17.25	7.00	Software Toolworks Inc	14.38	0.13	0.9
OTC	13.75	6.25	State of the Art	7.75	0.13	-1.6
NYS	35.61	17.63	Sterling Software Inc.	28.88	0.38	1.3
OTC	21.63	12.00	Struct. Dynamics Research	13.50	0.13	0.9
OTC	31.25	25.75	Sybase Inc.	48.31	2.56	8.0
OTC	20.50	10.88	Symantec Corp.	16.25	0.61	4.0
OTC	52.75	29.25	Synopsys	46.50	0.88	2.0
OTC	24.25	17.50	System Software Assoc.	14.69	0.56	4.0
OTC	6.75	2.88	[illegible] Corp	4.75	0.13	2.7
OTC	18.00	13.50	ViewLogic Systems	27.50	2.75	6.9
OTC	13.25	5.50	Walker Interactive Systems	9.50	-0.50	-5.0
OTC	60.00	12.75	Wall Data Inc	38.50	-3.50	-8.3
Semiconductors						UP [illegible]
NYS	37.88	16.75	Advanced Micro Devices	27.25	2.75	9.0
NYS	31.13	17.13	Analog Devices Inc.	29.00	3.38	13.2
OTC	50.13	18.75	Atmel Corp	47.75	5.25	12.4
OTC	7.50	2.75	Chips and Technologies	5.75	0.38	7.0
OTC	44.63	13.00	Cirrus Logic	36.00	3.61	11.2
NYS	19.88	9.61	Cypress Semiconductor Corp	18.50	0.25	1.5
NYS	20.00	11.75	Dallas Semiconductor	17.50	0.88	5.3
OTC	74.50	42.75	Intel Corp	68.63	1.61	2.4
NYS	23.00	10.50	LSI Logic Corp	20.50	1.13	5.8
OTC	28.75	12.25	Lattice Semiconductor	17.50	1.25	2.2
NYS	95.50	19.38	Micron Technology	94.63	13.00	15.9
NYS	109.75	68.63	Motorola Inc	106.50	7.00	7.0
NYS	25.00	12.00	National Semiconductor	21.25	0.63	3.0
OTC	12.75	6.50	Sierra Semiconductor	8.38	0.13	1.5
NYS	89.50	51.63	Texas Instruments	79.50	3.25	4.3
OTC	18.88	6.50	VLSI Technology	14.38	0.50	3.6
OTC	14.38	5.13	Weitek	6.00	1.13	15.8
ASE	20.38	3.61	Western Digital Corp	17.38	0.61	3.7
OTC	50.75	29.75	Xilinx	51.00	2.88	5.2
OTC	40.75	21.50	Zilog Inc	39.75	0.00	0.0
Peripherals and Subsystems						UP [illegible]
OTC	30.50	12.25	American Power Conversion	25.50	0.50	2.0
OTC	26.75	16.00	Banctec Inc.	22.00	-0.50	-2.2
OTC	9.00	3.50	Cambex Corp	4.00	-0.11	-3.0
ASE	8.25	1.03	Cognitronics Corp. (L)	4.00	0.00	0.0
NYS	20.50	9.00	Conner Peripherals	14.63	-0.63	-4.1
OTC	39.25	17.50	Creative Technologies Inc.	23.75	-2.50	-9.5
OTC	25.00	6.50	Data Race Inc	8.50	0.38	4.6
ASE	11.63	4.75	Dataram Corp (L)	5.13	-0.13	-2.4
NYS	23.00	6.03	EMC Corp.	20.75	0.50	2.5
OTC	16.50	3.11	Emulex Corp	3.88	-0.13	-3.1
OTC	21.00	14.25	Evans & Sutherland	19.00	0.00	0.0
OTC	22.50	7.50	Exabyte	19.25	0.63	3.3
OTC	34.00	7.50	Intelligent Info. Systems	8.50	0.13	1.5
OTC	5.13	2.25	Iomega Corp	2.50	0.00	0.0
OTC	9.75	5.75	IPL Systems Inc	7.50	0.00	0.0
OTC	28.50	13.75	Komag Inc.	24.50	1.50	6.5
OTC	8.63	4.38	Maxtor Corp	7.50	0.00	0.0
OTC	8.75	4.88	Micropolis Corp.	8.11	1.50	22.0
NYS	117.00	97.25	3M Corp (L)	101.00	3.38	3.4
OTC	8.50	6.75	Printronix Inc	8.75	0.50	6.1
NYS	17.25	7.50	QMS Inc	8.13	0.13	1.6
OTC	20.25	9.38	Quantum Corp	16.13	0.38	2.0
OTC	9.13	3.13	Radius Inc.	7.50	0.75	9.1
NYS	17.75	11.63	Recognition International (L)	13.61	1.50	11.4
OTC	6.88	3.63	Rexon Inc.	6.50	0.75	11.0
OTC	28.75	13.13	Seagate Technology	26.19	3.38	6.0
NYS	45.00	21.25	Storage Technology	30.38	-2.00	-6.2
NYS	12.63	75.38	Tektronix Inc	31.61	1.75	5.9
NYS	103.75	69.88	Xerox Corp	101.00	6.13	6.5
Services						UP [illegible]
OTC	23.75	16.88	American Mgmt. Systems	20.61	0.86	4.4
NYS	4.25	2.38	Anacomp Inc	3.88	0.13	3.3
OTC	23.50	14.50	Analysts Int'l	16.25	-1.25	-7.1
NYS	56.88	46.88	Auto Data Processing	51.75	0.88	1.7
OTC	18.25	7.00	Cambridge Tech. Partners	14.75	0.00	0.0
NYS	23.88	13.00	Ceridian Corp	22.63	-0.25	-1.1
NYS	24.25	13.88	Comdisco Inc.	21.75	2.25	11.5
OTC	12.50	4.50	Computer Horizons	10.50	1.13	12.0
NYS	41.75	23.94	Computer Sciences	38.25	1.88	5.2
NYS	8.75	6.00	Computer Task Group	7.00	0.00	0.0
NYS	35.00	17.38	CompUSA Inc	20.11	-1.00	-5.2
OTC	13.88	7.75	Control Data Systems Inc (L)	6.25	0.13	2.5
OTC	16.00	7.00	Corporate Software	15.38	0.00	0.0
OTC	11.00	6.63	Egghead Discount Software	8.63	-0.13	-1.4
NYS	36.88	26.00	General Motors E (EDS)	35.50	1.11	3.1
OTC	22.75	12.75	Inacom Corp	16.75	0.75	4.8
OTC	28.00	12.00	Intelligent Electronics	25.00	0.75	3.3
OTC	22.50	9.75	[illegible]	19.50	0.25	1.4
OTC	12.50	8.16	Microage Inc	24.00	-0.25	1.0
OTC	40.50	23.84	Paychex	35.50	-0.25	0.7
NYS	47.00	21.63	Policy Management Sys.	38.86	-2.75	-6.7
NYS	24.88	10.00	Reynolds and Reynolds	22.25	1.50	7.2
OTC	28.50	13.00	SEI Corp	24.00	0.50	2.1
OTC	29.38	17.50	Shared Medical Systems	17.75	1.61	6.3
OTC	12.61	3.63	SPR Systemhouse	7.31	0.56	8.3
OTC	30.75	13.50	Software Spectrum Inc. (L)	16.75	0.75	5.6
OTC	42.75	28.00	Sungard Data Systems	35.75	0.75	2.1

KEY: (H) = New annual high reached in period (L) = New annual low reached in period

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What was your *most* interesting Comdex experience?

"Speaking at a press conference and having only one person show up. He left halfway through my presentation. I found out later that the Jackson family was being interviewed down the hall. I did not know that the Jacksons were into computers!"

JOHN BRADLEY, SENIOR VICE PRESIDENT, CORPORATE DEVELOPMENT, LIANT SOFTWARE CORP

"Being rear-ended in a rental car while hurrying to keep an appointment with a customer."

ISAAC KONG, CHIEF EXECUTIVE OFFICER, NETSOFT

"When I approached a competitor's booth, trying to introduce myself to their senior representatives, I was identified as a 'spy' by one of their overzealous foot soldiers and thrown out of their booth."

BRIAN D. OWEN, PRESIDENT AND CHIEF EXECUTIVE OFFICER, MAPINFO CORP

WYSIWYG COMPILED BY LISA DAVIDSON; ILLUSTRATIONS BY MICHAEL MORAN

The 5th Wave *by* Rich Tennant

Inside Lines

Beware the Pentium flood

Led by Compaq and Dell, the deluge of boxes based on Intel's new P54C Pentium chip will hit the market starting today. Compaq will come out with the DeskPro/XL, the DeskPro/M replacement, featuring the PCI bus in place of the TriFlex architecture, SoundBlaster-compatible Business Audio and a new version of QVision. Meanwhile, Dell will introduce P54C models of its Dimension and OptiPlex desktops, with enhanced graphics acceleration, priced at less than $3,000.

Carriers testing CDPD services

Ameritech Cellular Services in Hoffman Estates, Ill., hopes to be the first carrier with a commercial Cellular Digital Packet Data (CDPD) service. CDPD, a scheme for sending packet data over an analog voice cellular network, is being tested by several cellular carriers. Ameritech's commercial service for the Chicago market is on track for the end of June, according to company officials, who said five of 13 companies are already beta-testing the service.

Making music together

Sun Microsystems and Amdahl are said to have signed their first big deal since partnering to gain enterprise business last fall. Sources at both firms said a multiyear contract to provide Sun's servers and workstations, along with Amdahl's consulting services, has been signed with San Francisco discount brokerage firm Charles Schwab & Co. With its mainframe data center located in Phoenix, Schwab is installing Unix systems and the Open Software Foundation's Distributed Computing Environment at its sales offices nationwide.

When we last left our heroes . . .

The latest rumors surfacing about the Lotus/Novell relationship have Bob Frankenberg seeking a closer relationship with Lotus, a prerequisite for his becoming Novell's CEO and president. Analysts say that something beyond the current, limited Notes NetWare Loadable Module is indeed coming—probably an implementation of Notes on Novell's AppWare client development environment. The big question is whether Lotus' CC:Mail and upcoming messaging engine will hook into NetWare via AppWare; Novell and WordPerfect keep saying they will open up to competitors.

Get your red hot SNA techies!

IBM's troubles are Cisco's opportunity: The router vendor has been rapidly gobbling up some of the SNA techies that IBM has been putting on the streets, according to one analyst. Meanwhile, Cisco still cannot attach a delivery date for its support of IBM's Advanced Peer-to-Peer Networking Node, a company spokesman said. The original date was the second half of this year.

Ten and out

The 10-way ES/9000 that IBM introduced last week will more than likely be the last of its traditional emitter-coupled logic mainframes, according to executives at IBM's Large Scale Computing division. "If the market demands more, we will produce more," said Gary Ferdinand, director of the new parallel System/390 systems. But it "clearly makes more sense for us to produce and for our customers to buy" the CMOS-based parallel machines, he said.

Just the mention here last week of computer nightmares reminded Bruce Miller (72360.2212@CompuServe.COM) of the time his doorbell woke him at 3 a.m. There stood a police officer responding to a call from his house to the 911 emergency number. No one had actually spoken on the call, but the police came to investigate. So who called? The number that Miller's modem is connected to. "I explained the situation, she left, I turned off the computer and went back to sleep," Miller says. Well, if any other computer goings-on wake you at night, don't hesitate to contact Computerworld. *You can call our 24-hour voice-mail tip line at (508) 820-8555 or our toll-free number at (800) 343-6474. News Editor Maryfran Johnson can be reached by phone at (508) 820-8179, via the Internet at mjohnson@cw.com or through MCI Mail at 590-5017.*

KIDDING

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